KENWOOD

2m FM TRANSCEIVER

Model TR-7950
TR-7930

INSTRUCTION MANUAL

INTRODUCTION

You are the owner of our latest product, the new TR-7950 (or TR-7930) transceiver. Please read this instruction manual carefully before placing your transceiver in service. The unit has been carefully engineered and manufactured to rigid quality standards, and should give you satisfactory and dependable operation for many years.

AFTER UNPACKING

- Shipping container:
  Save the boxes and packing in the event your unit needs to be transported for remote operation, maintenance, or service.
- The following explicit definitions apply in this manual:
  Note: If disregarded, inconvenience only, no risk of equipment damage or personal injury.
  Caution: Equipment damage may occur, but not personal injury.

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■ ACCESSORIES

Carefully unpack your TR-7950 (or TR-7930) and check that it is supplied with the following accessories:

(1) Dynamic microphone (with U/D switch) (T91-0313-05)	1 piece
(2) Mounting Bracket	
Mounting parts:	
Hex wrench (w01-0401-04)	1 piece
Nuts (5 mm diameter) (N14-0510-04)	4 pieces
Hex-socket screw (N09-0008-04)	4 pieces
Flat washers (6 mm diameter) (N15-1060-46)	4 pieces
Spring washer (6 mm diameter) (N16-0060-46)	4 pieces
(3) Foot	
Rubber foot (small, rear) (J02-0069-05)	2 pieces
Rubber foot (large, front) (J02-0070-05)	2 pieces
Screw (N30-3006-41)	4 pieces
(4) DC power cord (with 2P plug and fuse) TR-7950(E30-1685-05)/ TR7930(E30-1674-05)	1 piece
(5) Spare fuse	
TR-7950(10A) (F05-1031-05)	1 piece
TR-7930(8A) (F05-8021-05)	1 piece
(7) Miniature plug (for external speaker) (E12-0001-15)	1 piece
(9) Warranty card	1 copy
(10) Instruction manual	1 copy

FEATURES

Outstanding features providing maximum ease of operation include a large backlighted, easy-to-read (either in direct sunlight or in the dark) LCD display, 21 multi-function memories, automatic offset, programmable priority channel, memory and programmable band scans, built-in lithium battery memory back-up, built-in 16-key autopatch, and the choice of a hefty 45 watts output (TR-7950), or 25 watts output (TR-7930).

TR-7950 FEATURES:

- **NEW, large, easy-to-read LCD digital display**
  Easy to read in direct sunlight or in the dark (backlighted). Displays transmit/receive frequencies, memory channel, repeater offset, (+, S, –), sub-tone number (F-0, 1, 2, 3), tone scan, and memory scan lock-out. Includes LED S/RF bar meter, and LED indicators for REVERSE, CENTER TUNING, PRIORITY, and ON AIR.

- **21 NEW, multi-function memory channels**
  Sotes frequency, repeater offset, and optional sub-tone channels. Memories 1 through 15 for simplex for ±600 kHz offset. Memory pairs 16/17, and 18/19 are paired for non-standard repeater offset. Memories "A" and "B" set upper and lower scan limits, or for simplex or ±600 kHz offset. In MEMORY mode, a circle of light appears around the memory selector knob. When the memory selector knob is rotated in either direction to channel 1, and audible "beep" will sound for visually impaired operators.

- **Choise of 45 or 25 watts output**
  The TR-7950 provides a hefty 45 watts output, while the TR-7930 features a more modest 25 watts. A HI/LOW power switch allows power reduction to approx. 5 watts(adjustable).

- **Long-life lithium battery memory back-up**
  Built-in lithium battery has an estimated 5 year life.

- **Automatic offset**
  The microprocessor is pre-programmed for simplex or ±600 kHz offset, in accordance with the ARRL 2 meter band plan. "OS" key allows manual offset change.

- **Programmable priority alert**
  The PRIORITY channel may be programmed as any one of the 21 memories, with the ALERT switch "ON," a dual "beep" sounds when a signal is present on the PRIORITY channel. The OPER switch allows and instant move to the PRIORITY channel.

- **Programmble memory scan lock-out**
  "LO" key for programming the scan to skip selected memory channels, without erasing the memory.

The lower limit may be programmed into memory "A" and the upper limit into memory "B".

- **Center stop during band-scan, with indicator**
  Stops on a channel center during band-scan, with center tuning indicator.

- **Scan resume selectable**
  Scan stops on busy channel. Selectable automatic time resume-scan (approx. 5 sec., adjustable), or carrier operated resume-scan. a scan delay after carrier-drop of approx. 1.5 seconds is built-in.

- **Scan control using up/down microphone**
  Momentarily pressing UP or DWN button on microphone tunes one step in the selected direction, on memory or on 5-kHz step tuning. Holding the button for about 2 seconds starts UP or DWN automatic scan action. Scan also starts using "SC" key on keyboard. Scan may be cancelled by momentarily pressing the PTT switch or by pressing both UP/DWN buttons simultaneously.

- **Programmable sub-tone channels**
  Optional TU-79 three frequency sub-tone unit provides keyboard selectable sub-tone channels, which may be stored in memory.

- **Built-in 16-key autopatch, with adjustable monitor**
  The keyboard functions as a 16-key autopatch during transmit. DTMF tones appear in the speaker output when a key is pressed during transmit.

- **Front panel keyboard control**
  Used for selecting frequent panel keyboard control.
  Used for selecting frequency offset, programming memories, controlling scan, and autopatch encode. Keyboard night lighting is provided.

- **Extended frequency coverage**
  covers 142.000-148.995 MHz, in 5-kHz steps.

- **Repeater reverse switch**
  Locking-type switch, with indicator.

- **"Beeper" amplified through speaker (Level adjustable)**

- **Compact, lightweight design**

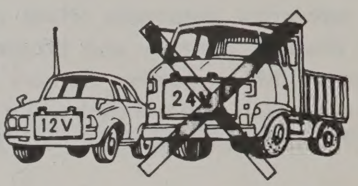
- **Easy-to-install adjustable-angle mobile mounting bracket**

Optional accessories:

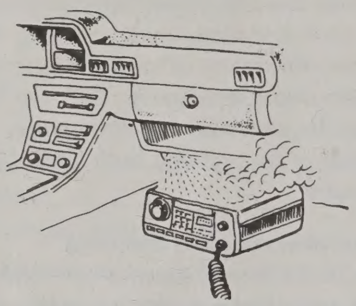
- TU-79 three frequency diode programmable tone unit.
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7A fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.

BEFORE USE

BEFORE connection, check polarity.

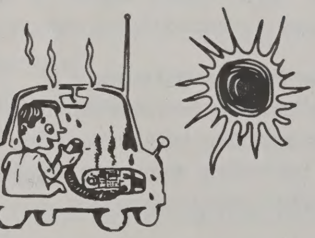


This unit is designed for 12V negative ground ONLY.



Do not install near heater outlet.

Keep equipment away from heat and out of direct sunlight.



After parking in the sun, or if inside temperature is HOT, cool this unit BEFORE transmitting.

Do not adjust coil, trimmers, or pots! These are factory adjustments.

SPECIFICATIONS

[General]

Semiconductors	MPU 1
	ICs 19
	Transistors 43
	FETs 5
	Diodes 61
Frequency range	144.000 to 147.995 MHz
Frequency synthesizer	Digital control, phase locked VCO
Mode	FM (F3)
Anntenna impedance	50 ohms
Power requirement	13.8V DC ±15%
Grounding	Negative
Operating temperature	–20°C to +50°C
Current drain	0.5V in reverive mode with no input singal
	Max. 9.5A in HI transmit mode (TR-7950)
	3.0A in LOW transmit mode (TR-7950)
	Max. 6.5A in HI tramsmit mode (TR-7930)
	2.5A in LOW transmit mode (TR-7930)
Dimension	175 mm (6 – 7/8) wide
	64 mm (2 – 1/2) high
	220 mm (8 – 11/36") deep (TR-7950)
	206 mm (8 – 1/16") deep (TR-7930)
	(projections excluded)
Weight	1.9 kg (4.18 lb) (TR-7950)
	1.8 kg (3.96 lb) (TR-7930)

[Transmitter]

RF output power (at 13.8V DC, 50Ω load)	HI 45 Watts min. (TR-7950)
	HI 25 Watts min. (TR-7930)
	LOW 5 Watts approx. (not adjustable)
Modulation	Phase sift
Frequency tolerance (–20°C ~ +50°C)	Less than $\pm 15 \times 10^{-6}$
Spurious radiation	HI Less than –70 dB
	LOW Less than –60 dB
Maximum frequency deviation (FM)	±5 kHz
Audio response	Within +1/–3 dB of 6 dB/oct pre-emphais characteristic from 300 to 3000 Hz.
Audio distortion	3% max.
Microphone	Dynamic microphone with PTT switch, 500Ω

[Receiver]

Circuitry	Double superheterodyne
Intermediate frequency	1st 10.695 MHz
	2nd 455 kHz
Receiver sensitivity	Better than 30 dB for 0.5 µV S+N/N
	Better than 12 dB for 0.25 µV SINAD
Receiver selectivity	More than 12 kHz (–6 dB)
	Less than 24 kHz (–60 dB)
Spuriour response	Better than 70 dB
Squelch sensitivity	Less than 0.16 µV (threshold)
Auto scan stop level	Less than 0.2 µV (threshold)
Audio output	More than 2.0 watts across 8 ohms load (5% dist.)

Note: Circuit and ratings are subject to change without notice due to developments in technology.

SECTION 1 INSTALLATION

1-1. Interconnection

Connect the antenna and power supply as shown in Fig. 1-1 for fixed station.

1-2. MOBILE Installation, [general]

● Installation location

Using the supplied mounting bracket, install the transceiver under the dashboard or on the side of the console in your car.
Refer to Fig. 1-2A and Fig. 1-2B on page 7.
If your car is equipped with and electronic fuel injector, the transceiver should be as far from the control equipment as possible.

● Antenna installation

Various types of antennas for 2 meter mobile operation are available. (See Fig. 1-2C)

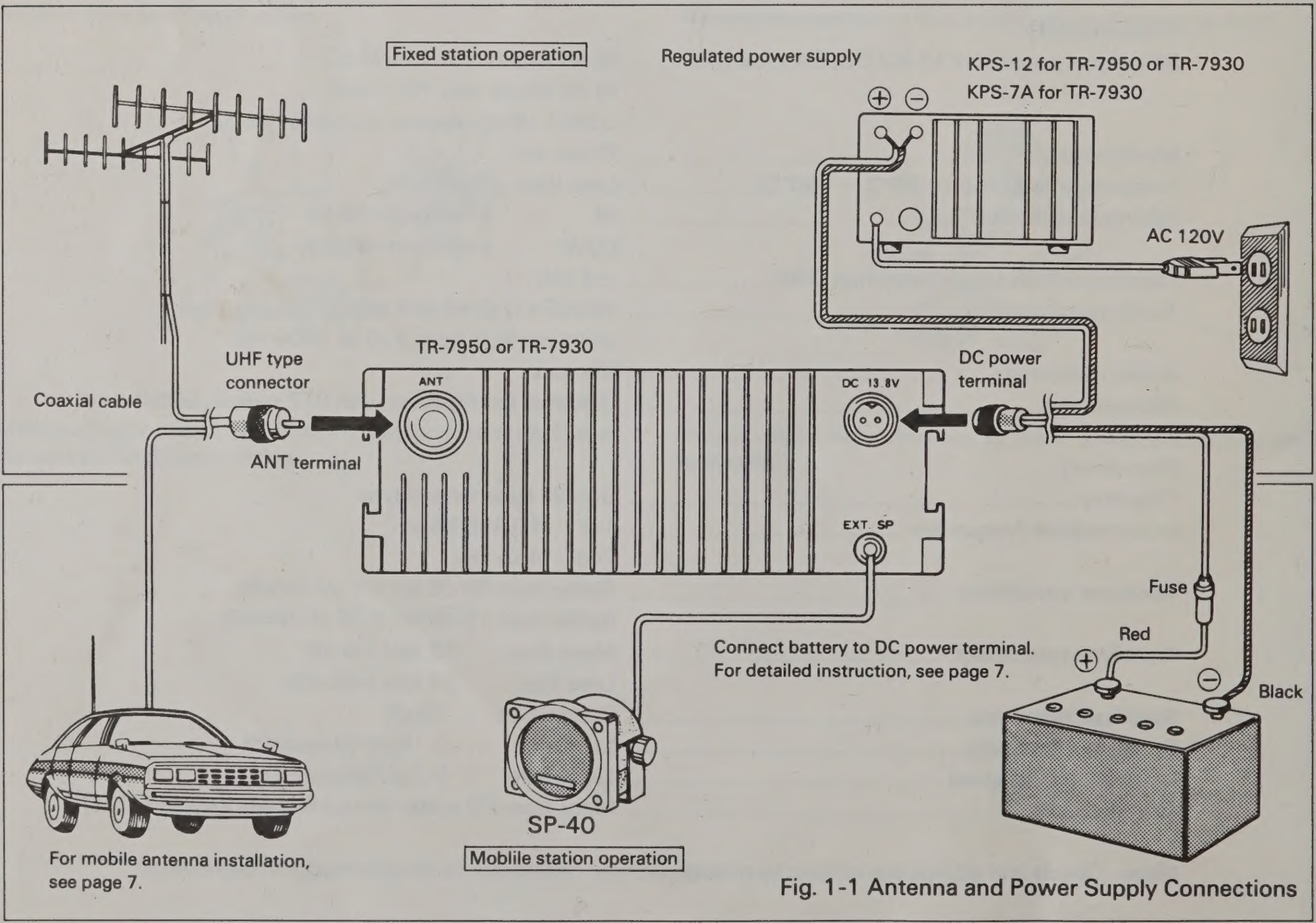
NOTE:
For gutter-mount installation, the antenna bracket must be grounded to the car body as shown in Fig. 1-2C. Affix the antenna securely, referring to the antenna instruction.

● Power supply

Connect the supplied power cable with fuse directly to the battery terminals. Connecting to the cigarette lighter socket can cause a poor connection, and excessive voltage drop.

● Ignition noise

The transceiver is designed to supress ignition noise; however, if excessive noise is present, it may be necessary to use suppressor spark plugs (with resistors).



Connect battery to DC power terminal.
For detailed instruction, see page 7.

For mobile antenna installation,
see page 7.

Fig. 1-1 Antenna and Power Supply Connections

1-3. FIXED STATION Installation, [general]

● **Power supply (Fig. 1-3 on page 8)**

For the TR-7950, the KPS-12 base power supply is recommended. For the TR-7930, either the KPS-12, or KPS-7A supply is recommended.

● **Antenna (Fig. 1-3 on page 8)**

Various types of fixed station antennas are commercially available. Select an antenna according to your installation space and application.

Note that the VSWR of your antenna should be less than 1.5:1.

A high VSWR will cause the Transceiver's protective circuit to operate, reducing the transmitter output power.

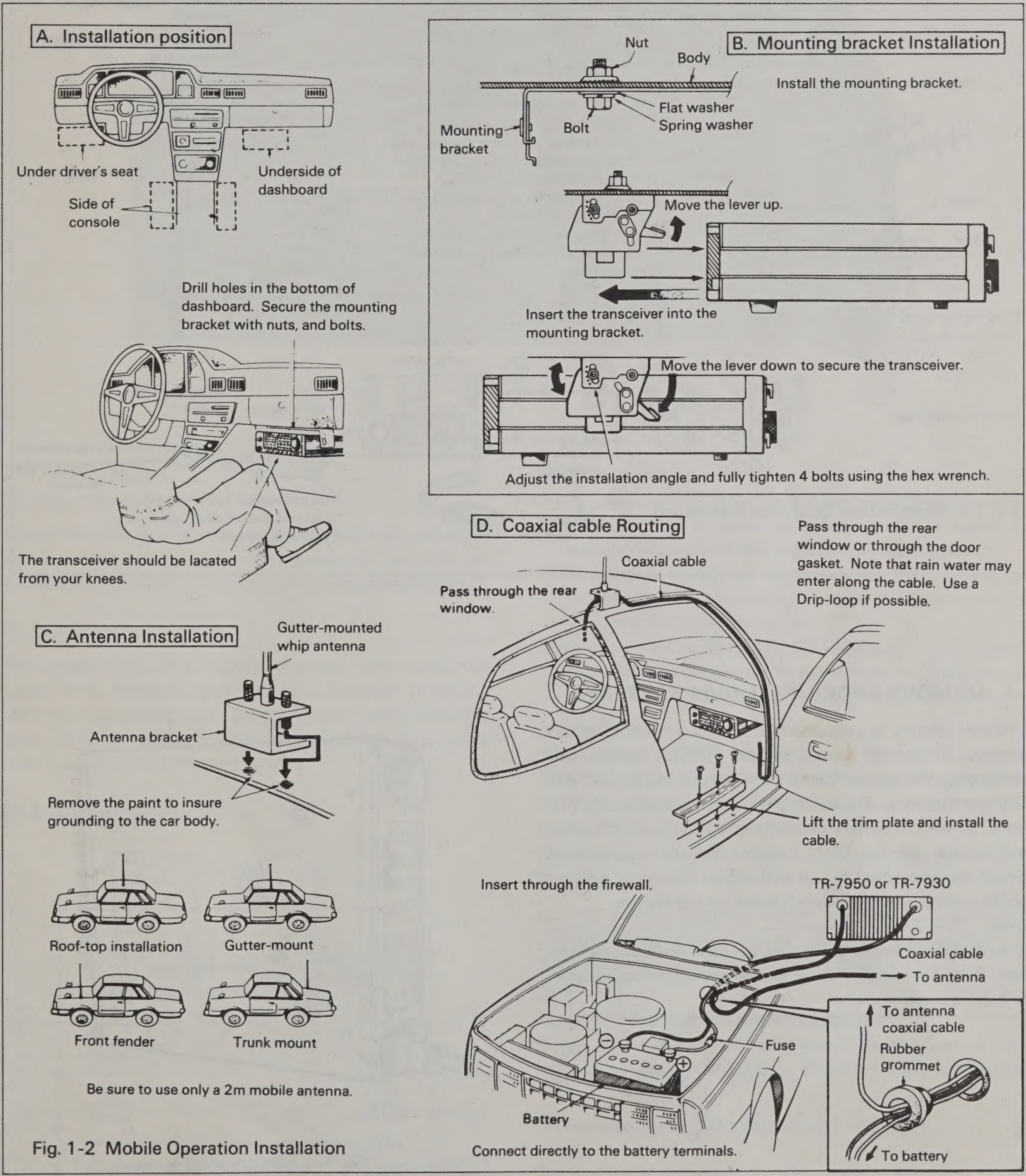
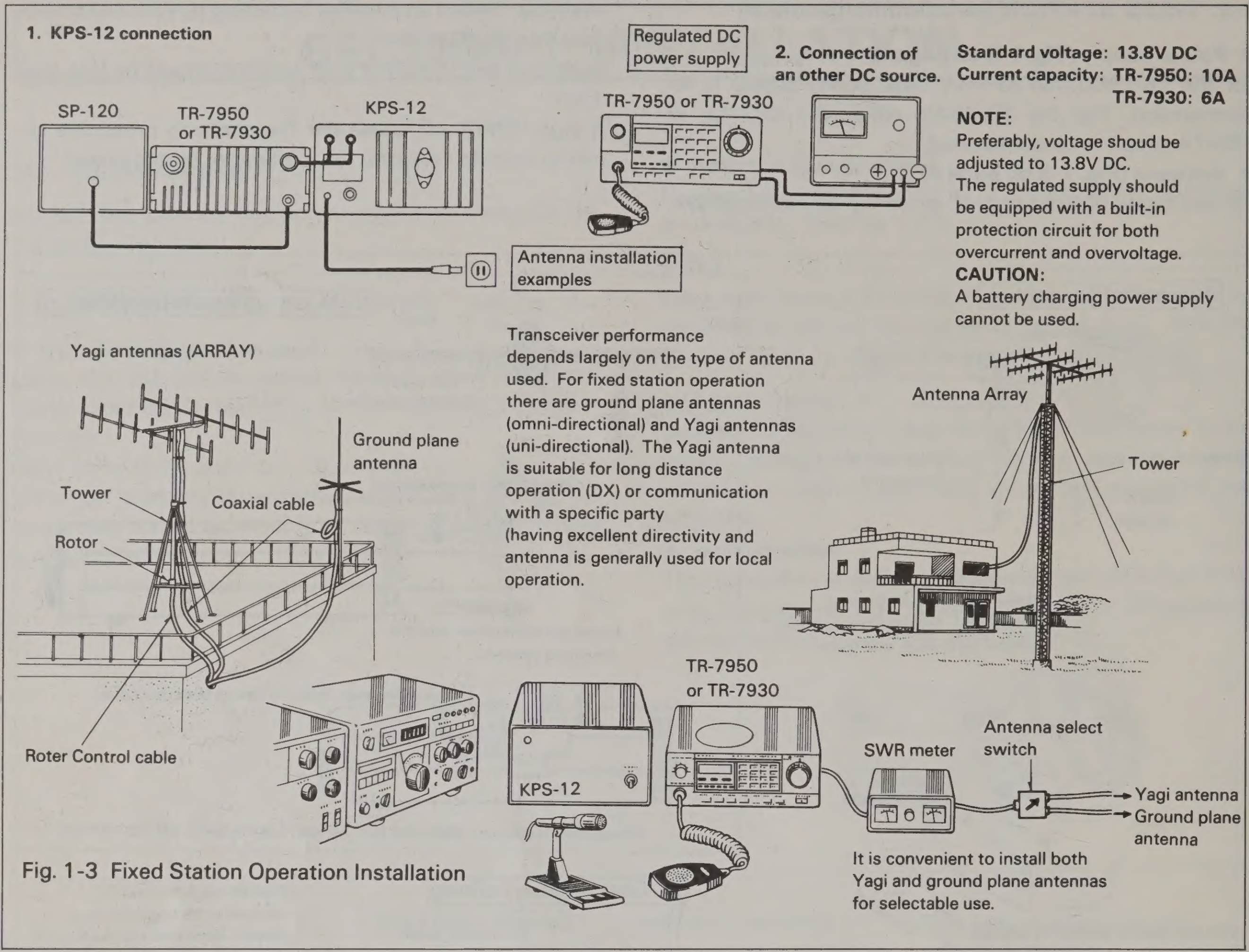

A. Installation position
Under driver's seat
Underside of dashboard
Side of console
Drill holes in the bottom of dashboard. Secure the mounting bracket with nuts, and bolts.
The transceiver should be lacated from your knees.
B. Mounting bracket Installation
Nut
Body
Install the mounting bracket.
Flat washer
Spring washer
Mounting bracket
Bolt
Move the lever up.
Insert the transceiver into the mounting bracket.
Move the lever down to secure the transceiver.
Adjust the installation angle and fully tighten 4 bolts using the hex wrench.
C. Antenna Installation
Gutter-mounted whip antenna
Antenna bracket
Remove the paint to insure grounding to the car body.
Roof-top installation
Gutter-mount
Front fender
Trunk mount
Be sure to use only a 2m mobile antenna.
D. Coaxial cable Routing
Coaxial cable
Pass through the rear window.
Pass through the rear window or through the door gasket. Note that rain water may enter along the cable. Use a Drip-loop if possible.
Lift the trim plate and install the cable.
Insert through the firewall.
TR-7950 or TR-7930
Coaxial cable
To antenna
To antenna coaxial cable
Rubber grommet
Fuse
Battery
To battery
Connect directly to the battery terminals.

Fig. 1-2 Mobile Operation Installation



Standard voltage: 13.8V DC
Current capacity: TR-7950: 10A
TR-7930: 6A

NOTE:
Preferably, voltage shoud be adjusted to 13.8V DC.
The regulated supply should be equipped with a built-in protection circuit for both overcurrent and overvoltage.

CAUTION:
A battery charging power supply cannot be used.

Transceiver performance depends largely on the type of antenna used. For fixed station operation there are ground plane antennas (omni-directional) and Yagi antennas (uni-directional). The Yagi antenna is suitable for long distance operation (DX) or communication with a specific party (having excellent directivity and antenna is generally used for local operation.

It is convenient to install both Yagi and ground plane antennas for selectable use.

Fig. 1-3 Fixed Station Operation Installation

1-4. MEMORY BACK-UP LITHIUM BATTERY

A lithium battery is contained in the transceiver to retain memory. Therefore, turning off the POWER switch, disconnecting the power cable, or a power failure will not clear the memory. The battery will last approximately five years. When the battery discharges and erroneous display may appear on the LCD. Lithium battery replacement should be performed by an authorized Kenwood service facility – either your Kenwood dealer, or the factory.

Note:

When the lithium battery is replaced, the microprocessor must be reset. Press the microswitch accessible through the opening on the bottom cover, as shown.

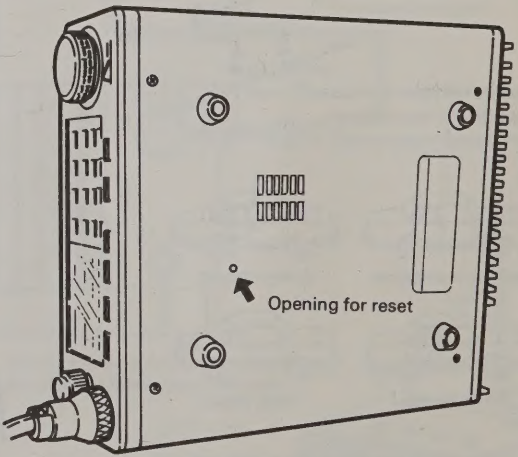
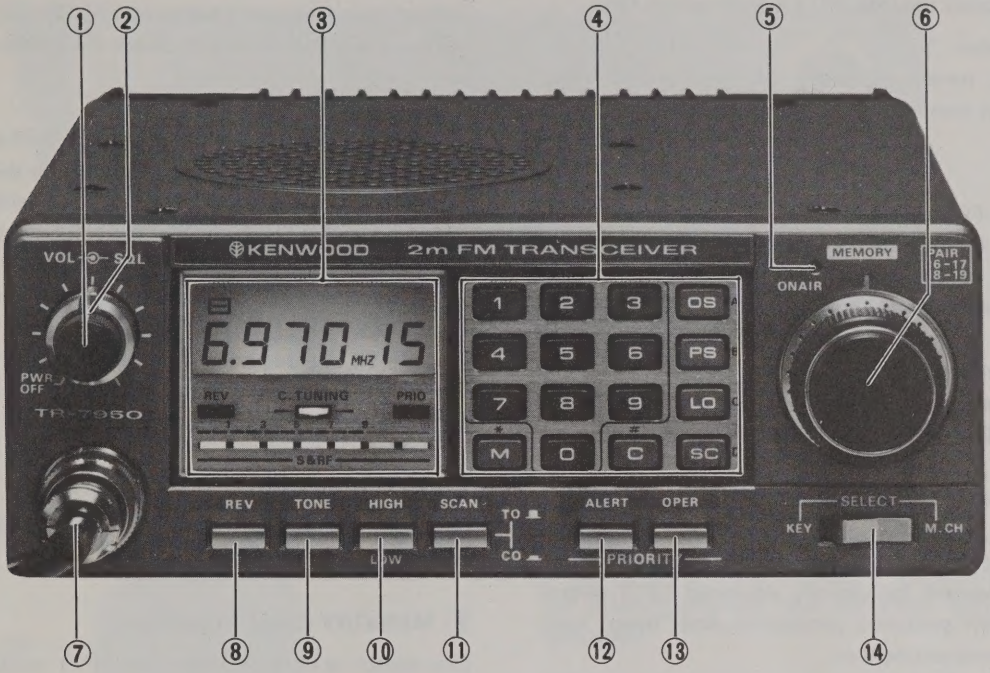


Fig. 1-4 Microprocessor reset

SECTION 2. CONTROLS AND TERMINALS



2-1. Front Panel

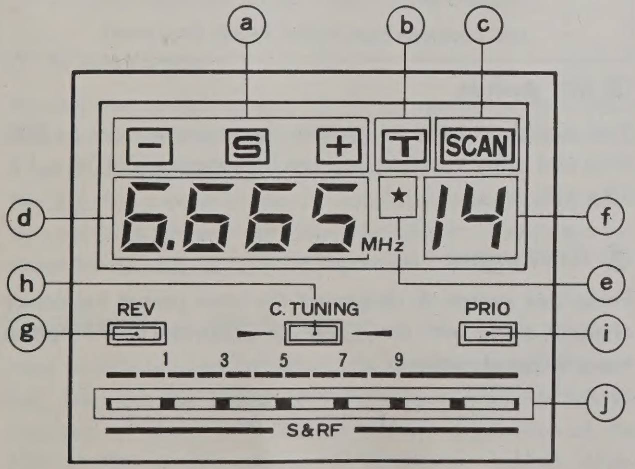
① VOL/POWER

Power ON-OFF switch and volume control are combined. Turning the control fully counterclockwise will turn the power OFF. Clockwise rotation will increases the volume.

② SQUELCH

The squelch control is used to eliminate noise during no-signal time. Normally, this control is adjusted clockwise until the noise disappears and the Center Tuning indicator goes off (threshold level). For scan operation, this control must be set to the threshold point.

③ LCD and Indicator Group



a) TX shift indicators:

⊟ By pressing the [OS] key on the keyboard, the ⊟ indicator will light in sequence to show transmit frequency is switched down 600 KHz from the receive frequency.

[S] By pressing the [OS] key on the keyboard, the [S] indicator will light in sequence to show the transceiver is operating in the simplex mode.

⊞ By pressing the [OS] key on the keyboard, the ⊞ indicator will light in sequence to show transmit frequency is switched up 600 KHz from the receive frequency.

b) [T] indicator:

By pressing the TONE pushbutton the four digit frequency display changes to show which of three preset subaudible frequency channels is selected. [T] does not display at F0 (no tone). TU-79 option required.

c) [SCAN] indicator lights when scan operation is in progress.

d) This section displays either frequency in four digit (146.520 MHz is displayed as 6.520), or one of four subtone conditions (F1 – 3, or 0, no tone).

e) ★ mark:

Memory channel scan lock-out designator.

If you desire to skip a busy memory channel during memory scan, press the [LO] key. The star designates scan-skip.

f) Memory channel display indicates A. B. and 1 ~ 19.

g) This LED indicator lights when the REV switch is ON.

h) This indicates the transceiver has stopped at channel center.

i) This LED indicates the PRIORITY-OPER switch ON.

j) S/RF Level meter
This LED level meter indicates relative receive input signal strength or transmit RF output.

④ Keyboard

"BEEPER" TONE FEEDBACK
Many keys and functions supply user-feedback to assure command entry or excecution. Tone level is adjustable. See page 13, "Beeper" level adjustment.
Tone signals:
* Keyboard operation frequency entry
* Subtone frequency (preset channel number 1 – 3, 0)
* Memory * Clear * Scan * Offset
* Program scan
* Lockout (initiate or cancel)
* Tone subtone) on or off

Channel 1 selected by memory channel selector knob (especially convenient for visually impaired OPS) microphone UP or DWN switches; pressonce, one "beep" hold, one "beep" per step or channel.
The keyboard has the following functions (Refer to "SECTION 3. OPERATION"):

- 1 – 0 (Number) keys:

Depress four keys to set the desired operating frequency.
Example: Depress the 6, 9, 4 and 0 keys. The frequency display will indicate "6.940" (146.940 MHz).
The number keys function as auto-patch keys during transmit mode (Section 3-6).
Pressing 1, 2, or 3 in the TONE MODE selects the preprogrammed tone frequency. Pressing 0 cancels the selected tone frequency.

- OS (Offset select) key

Depress this key to select a non standard frequency shift (simplex, +, or –, 600 kHz). (Standard frequency shift are preset.)

- PS (Priority Select) key

This is used to designate the priority channel. First, select the desired channel, then depress the PRIORITY-ALERT switch and press the PS switch.

- LO (Lock-out) key

This is used to designate the memory channels to be skipped during memory channel scan. Select the channel to be skipped with the SELECT switch set to M. CH and press this key. A star ★ appears on the LCD to show channel lock-out .

- SC (Scan) key

This is used for scan operation. Press the key when the SQUELCH (2) is ON. This will start band or memory-scan, depending on the position of the SELECT switch.

- M key

With the SELECT switch in the KEY setting, press this key to store the displayed frequency (with frequency shift) in the selected memory channel. In the TONE MODE and the desired tone frequency selected (1, 2, 3 or 0), pressing this key either stores or clears the TONE designation in memory.

- C (Clear) key

Use this key if you have mistakenly entered a setting.
By pressing this key, the frequency set by the number keys is cleared. When cleared, the frequency display will indicate the frequency that was displayed before the last entry was cleared.
This key is also used to release the scan operation.
Auto Patch:
This is a 16 button pad in Transmit mode.
During transmission, the key pad is automatically a Tone pad. Simply press any key, as needed.

⑤ ON AIR Indicator

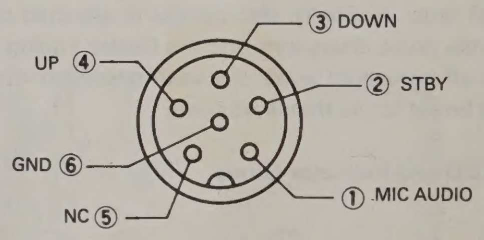
This light emitting diode (L.E.D.) will light during transmit mode.

⑥ MEMORY Channel Selector

This switch is used to select one of 21 memory channels. Of these, channels 1-15 store frequencies including ±600 kHz offset. Channels, 16 – 17 and 18 – 19 are paired for "ODD-SPLIT" operation. Channel A stores the programmed scan low frequency limit, and channel B stores the high frequency limit.

⑦ MIC Connector (6-pin)

For connection of the supplied microphone (or and MC-46 autopatch microphone).



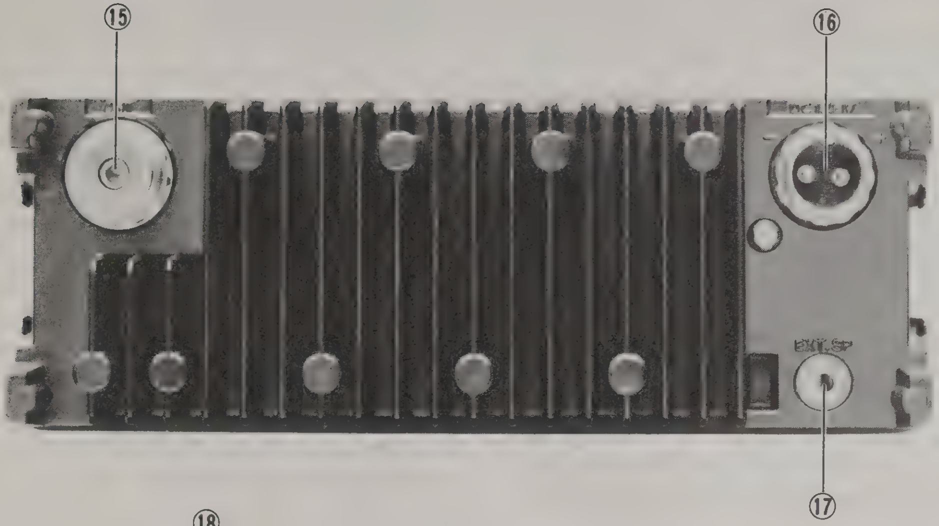
MIC connector from FRONT PANEL (lead color)

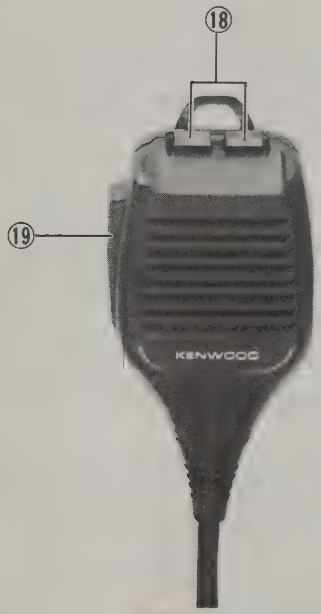
⑧ REV Switch

This switch is used to reverse the repeater shift (±600 kHz) and other transmit/receive frequencies (CH 16 – 17, 18 – 19).

⑨ TONE switch

Press this switch to designate the tone preset frequency channel, along with the 1, 2, or 3 keys. (TU-79 option required for operation.)





⑩ HIGH/LOW switch

HIGH setting: This setting allows the TR-7950 to transmit power output up to 45 watts and the TR-7930 up to 25 watts.
LOW setting: This setting allows the TR-7950 or TR-7930 to transmit power output up to 5 watts.

⑪ SCAN switch

Placing this switch to the TO (timer operation hold) position controls the scan operation by a timer (approximately 5 seconds, adjustable).
Placing this switch to the CO (carrier operated hold) position controls the scan operation by carrier; therefore, scan stops for as long as a carrier is present.

⑫ PRIORITY ALERT Switch

This switch is used to check the specified priority channel. Depress the switch and the priority channel will be checked at about a 6 second interval regardless of the KEY/M. CH switch position. A "dual beep" sounds when the priority channel is in use.

⑬ PRIORITY OPER Switch

This switch is used to call-up the priority channel. By depressing the switch, operating frequency is switched to the priority channel, and the PRIO LED lights to show operation.

⑭ SELECT Switch

Setting this switch to KEY permits keyboard operation; setting to M. CH permits preset memory channel operation.

2-2 Rear Panel

⑮ ANT Terminal

Connect a 50-ohm antenna to this terminal.

⑯ DC Power Terminal

DC power input terminal. Connect the supplied power cord with plug. Input voltage is 13.8V DC.
Observe plus(+) and minus(–) polarity!

⑰ EXT. SP Terminal

External speaker terminal. Connect a 4 ~ 16 ohm speaker using the supplied plug.

⑱ UP/DWN Switches

These switches are used to step the operating frequency up or down during both keyboard and memoriy channel operation.
When pressing a switch, a tone will sound.
When the UP or DWN switch is held on, scan mode is intiated.
Pressing both the UP and DWN switches simultaneously results in stopping the frequency control operation.

⑲ PTT Switch

Press-to-talk switch used for transmission. This will also release scan operation.

SECTION 3 OPERATION

3-1 BEFORE OPERATION

1. This transceiver uses a PLL(phase loocked loop) synthesizer controlled by a micro-computer. The operating frequency shifts in 5 kHz steps.
2. The transceiver covers a frequency range of 142.000 to 148.995 MHz.
3. Operating frequencies are input by simple keyboard entry. Up to 21 frequencies may be stored in memory (channels 1 through 19, A and B).
4. Transmitter precautions
   a) The TR-7950 (or TR-7930) antenna impedance is 50 ohms. Be sure to use only an antenna of 50-ohm impedance.
   b) Check the intended transmit frequency before operating to prevent interference with other stations.
   c) Pressing the microphone PTT switch places the transceiver in transmit mode; the ON AIR indicator will light and the LED bar meter shows transmitter power. Recommended distance to the microphone is approximately 5 cm.
5. Should an erroneous or incorrect readout be displayed at first power-on, reset the microprocessor by depressing the reset microswitch, following the instruction on page. 7.
6. Do not press any other keys until the correct frequency is input. The transceiver operates on the last frequency until a new frequency is input.
7. The shift mode is preprogrammed within the amateur band. This, however, can be overridden by the OS key.

f142.0	145.1	145.5	146.0	146.4	146.6	147.0	147.4	147.6	148.0	148.995
S	–	S	+	S	–	+	S	–	S	

8. For frequencies outside the 144.000 – 148.000 MHz, the transceiver operates only in the simplex mode.

3-2 SQUELCH

To eliminate receiver noise at the no-signal condition, slowly adjust the squelch clockwise until the noise disappears and the C. TUNING indicator goes off (threshold point).

The squelch will open, the C. TUNING indicator will light and the speaker will operate when a signal is received.

The squelch control is also used for scan operation control. If the singal is weak or fades during mobile operation, readjust the squelch for consistent reception.

3-3 MEMORY INPUT

Example: Storing 144.650 MHz with +600 kHz shift and subaudible tone "1" in memory channel 5.

Proceed:

1. Set the SELECT switch to KEY.
2. Press the 4, 6, 5, and 0 keys.
3. Press the OS key until + displays on the LCD.
4. Turn the MEMORY channel selector until memory 5 displays.
5. Press the M key to store in memory channel 5.
6. Press the TONE switch and select the desired tone frequency; in this case, by pressing the 1 key.
7. Again press the M key to store the TONE information in channel 5. Press the TONE switch again to call the stored frequency back to the display.
8. To check or recall the entry in channel 5, place the SELECT switch to M. CH. Display should remain unchanged, indicator data is correctly stored.
9. Use this general procedure to store frequencies in the other memory channels.

3-4 CHANGING MEMORY FREQUENCIES

If you wish to change any memory frequency, store a new frequency in that channel using the precious procedure. The old frequency is erased when the new frequency is stored.

3-5 SCAN OPERATION

The SCAN operation is divided into keyboard scan, memory scan and priority channel scan. For SCAN operation, the squelch control should be advanced to the threshold point. See section 3-2 Squelch.

First, select either timer operated hold (TO) carrier (signal) operated hold (CO) with the SCAN switch.

- **MEMORY SCAN from the keyboard**

1. Set the SELECT switch to M. CH.
2. Press the SC key to initiate scanning .
   The scan will beigin from the displayed channel advancing, toward the higher numbered channels. During this operation, holding the microphone DWN switch changes scan direction backward. Releasing the DWN switch returns scan direction forward. Holding the UP switch permits accelerated scanning.
3. To release the scan operation, press either the C key, the microphone PTT swith, or the microphone UP and DWN switches simultaneously.

- **MEMORY SCAN from the microphone**

1. Set the SELECT switch to M. CH.
2. Hold the UP (or DWN) switch for more than one second and scan operation will commence UP (or DWN) from the displayed channel. During this scan operation, pressing the DWN (or UP) switch once reverses the scan direction.

3. To manually accelerate scanning, hold the UP (or DWN) switch until the desired memory channel is reached.
4. To release the scan operation, press the PTT switch or the UP and DWN switches simultaneously.

- **PROGRAMMABLE BAND-SCAN from the keyboard**

The lower limit may be programmed into memory "A", and the upper limit in to memory "B".

1. Set the SELECT switch to KEY.
2. Press the SC key to initiate scan operation.
   Scan will start from the frequency stored in memory channel A and advance to the frequency stored in channel B. When the frequency in memory channel B is reached the process. During this operation, holding the microphone DWN switch changes the scan direction backward. When the DWN switch is released , the forward scan direction resumes. Holding the UP switch accelerates scanning.
3. To release the scan operation, press the C key, the microphone PTT switch, or the microphone UP and DOWN switches simultaneously.
4. To continue an interrupted keyboard scan from its stopping-point, use the microphone UP or DWN switches. Otherwise, the C key will always return the radio to the A channel frequency.

- **AUTO SCAN from the microphone**

1. Set the SELECT switch to KEY.
2. Hold the UP (or DWN) switch for more than one second. Scan operation will commence from the frequency displayed towards the upper frequency limit (148.995 MHz) or if down,towards the lower limit (142.000 MHz).
   During this scan, press the DWN (or UP) switch reverses the scan direction.
3. To accelerate the scan, hold the UP (or DWN) switch until the desired frequency is reached.
4. To release the scan operation, press the PTT switch or the UP and DWN switches simultaneously.

- **PRIORITY CHANNEL SCAN**

To monitor the priority channel, press the PRIORITY-ALERT switch in. When it is busy two beeps will sound every six seconds. The REV switch deactivates this system.

3-6 SCAN STOP

1. Scan may be canelled by turning off the power switch or power supply.
2. Transmitting or momentarily keying the PTT switch.
3. Pressing the keyboard C key.
4. Pressing the microphone UP and DWN switches simultaneously.
5. Pressing the REV switch.
6. Pressing the PRIORITY ALERT switch.
7. Pressing the PRIORITY OPER switch.
8. Moving the SELECT switch to the alternate mode.

3-7 SCAN LOCKOUT OPERATION

This transceiver has a scan lockout function which allows selectively skipping temporarily unwanted memory channels during memory scan.
Proceed:

1. Place the SELECT switch to M. CH.
2. Select the memory channel to be skipped by using the MEMORY selector.
3. Press the LO key and a star ★ appears to the left of the memory channel number.
4. Perform steps 2 and 3 to lockout any unwanted memory channels.
   To cancel channel lockout, select the memory channel to be restored, and press the LO key. The star will disappear.

3-8 PRIORITY CHANNEL SELECT

Any one of the 21 memory channels can be selected as the priority channel.

1. Set the SELECT switch to M. CH.
2. Press the PRIORITY-ALERT switch in.
3. Select the memory to be the priority channel.
4. Press the PS key to enter this instruction.

3-9 PRIORITY OPER Switch

To call-up the frequency stored in the priority channel, depress the PRIORITY OPER switch.

3-10 AUTOPATCH OPERATION

Press any key on the keyboard in transmit mode for autopatch operation.

3-11 TIMER OPERATED SCAN (TO) ADJUSTMENT

The scan timer is factory preset at approximately 5 seconds. This can be adjusted from 2 to 6 seconds.

1. Place the SCAN switch to TO.
2. Turn the SQL control fully counterclockwise to open the squelch.
3. Place the SELECT switch to M. CH.
4. Initiate scan by pressing the SC key.
5. Adjust VR1 (X53-1280-10) to the desired delay. (see Botton Biew on page 14.)

3-12 AUTOPATCH SIDETONE AND BEEPER LEVEL ADJUSTMENT

The autopatch sidetone level during and beeper level transmit are adjustable. As the volume is advanced, the level increases.

1. Adjust the VOL control to your normal listening leve.
2. With the microphone PTT press any key on the keyboard switch depressed and adjust VR3 (X55-1330-10) shown on page 14.

3-13 PAIRED CHANNELS

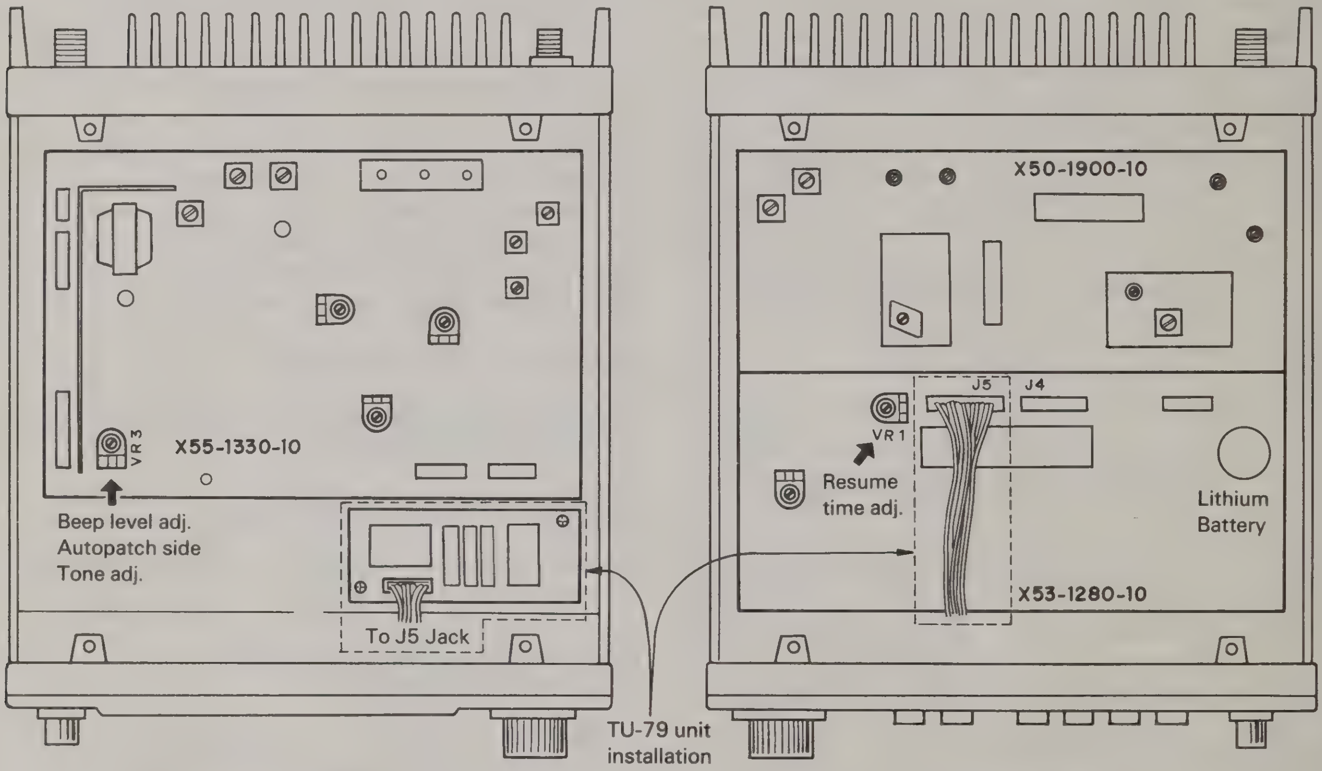
Two paired channels allow for "odd split" frequency shifts. Use this option when the desired frequency shift is to other than the standard 600 kHz shift. Any split within the full operating and range of the radio is possible.

Channel pairs are: CH's 16 – 17 and CH's 18 – 19

Example: A 1 MHz split store 145.600 MHz in CH 16 and 146.600 MHz in CH 17.

1. Follow the "MEMORY INPUT" procedure on page 12 to store these frequencies in channels 16 and 17. Either frequency (receive or transmit) may be stored in either channel of the pair.
2. To operate this channels pair, set the SELECT switch to M. CH and select either CH 16 with the MEMORY selector.
3. Transmit, and the displayed frequency changes to the transmit frequency stored in the alternate channel of the pair.
4. Return to the receive mode, and the original receive frequency stored in CH 16 will display.

The other channel pair, CH 18 – 19, operates in the same way. When channel pairs are used, the 600 kHz shift and-mode indicators, (+), (−), and (S), do not funtion.

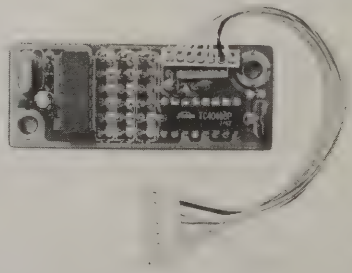


Top View

Bottom View

3-14 TU-79 (OPTION) INSTALLATION

1. Secure the TU-79 unit with 2 screws as shown in figure (Top View, whithin dotted line).
2. Plug the TU-79 lead connector to the jack (J5) shown in the figure (Bottom View).
3. Three tone frequencies can be selected out of 37 frequencies (67 Hz ~ 250.3 Hz). This can be done by 6 bit diode matrix.
4. Tone deviation is within ±0.5 ~0.7 kHz, adjusted.



TU-79

SECTION 4 ADDITIONAL INFORMATION

4-1 General Information

Your TR-7950 (or TR-7930) has been factory aligned and tested to specification before shipment. Under normal circumstances, the transceiver will operate in accordance with these operating instruction.

If your transceiver fails to work, contact the authorized dealer from which you purchased it for quick, reliable repair. All adjustable trimmers and coils in your transceiver were preset at the factory and should only be readjusted by a qualified technician with proper test equipment.

Attempting service or alignment without factory authorization.

4-2 How the TX Final Module are Protected

Final module protection is provided by sampling the reflected power. As the reflected power is increased (higher SWR) transmitter drive is reduced, thus decreasing input to the final module. This in turn reduces collector loss, protecting the final transistor.

4-3 Battery Precaution

When charging your vehicle battery, or when jump-starting a dead battery, ALWAYS disconnect the power cable from the back of the transceiver.

4-4 Ordering Spare Parts

When ordering replacement or spare parts for your equipment, be sure to specify the following:

- Model and serial number of your transceiver. Schematic number of the part. Printed circuit board number on-which the part is located. Part number and name, if known,and quantity desired.

NOTE:

A full service manual is availabel as a separate publication.

4-5 Service

Should it ever become necessary to return the equipment for repair, pack in its original box and packing,and include a full description of the problems involved. Also include your telephone number. You need not return accessory items unless directly related to the service problem. Tag all returned items with your call for identification.

Please mention the model and serial number of your radio in any correspondence, whether phone or written. For future reference, record this informationin the space provided on the back cover of this manual.

NOTE:

When claiming waranty service, please include a photocopy of the bill of sale,or other proof of purchase showing the date of sale.

TU-79 Tone frequencies

Note :

Symbols in the table below denotes as follows ;

X — **Cut diode,** ○ — **Diode remains mounted.**

#	EIA Specification		Program Lines					
	Group	Hz	1	2	3	4	5	6
1	C	67.0	X	X	X	X	X	X
2	B	71.9	X	○	X	X	X	X
3	C	74.4	X	X	○	X	X	X
4	A	77.0	○	○	X	X	X	X
5	C	79.7	X	X	X	○	X	X
6	B	82.5	X	○	○	X	X	X
7	C	85.4	X	X	○	○	X	X
8	A	88.5	○	○	○	X	X	X
9	C	91.5	X	X	X	X	○	X
10	B	94.8	X	○	X	○	X	X
11	A	100.0	○	○	X	○	X	X
12	B	103.5	X	○	○	○	X	X
13	A	107.2	○	○	○	○	X	X
14	B	110.9	X	○	X	X	○	X
15	A	114.8	○	○	X	X	○	X
16	B	118.8	X	○	○	X	○	X
17	A	123.0	○	○	○	X	○	X
18	B	127.3	X	○	X	○	○	X
19	A	131.8	○	○	X	○	○	X
20	B	136.5	X	○	○	○	○	X
21	A	141.3	○	○	○	○	○	X
22	B	146.2	X	○	X	X	X	○
23	A	151.4	○	○	X	X	X	○
24	B	156.7	X	○	○	X	X	○
25	A	162.2	○	○	○	X	X	○
26	B	167.9	X	○	X	○	X	○
27	A	173.8	○	○	X	○	X	○
28	B	179.9	X	○	○	○	X	○
29	A	186.2	○	○	○	○	X	○
30	B	192.8	X	○	X	X	○	○
31	A	203.5	○	○	X	X	○	○
32	B	210.7	X	○	○	X	○	○
33	A	218.1	○	○	○	X	○	○
34	B	225.7	X	○	X	○	○	○
35	A	233.6	○	○	X	○	○	○
36	B	241.8	X	○	○	○	○	○
37	A	250.3	○	○	○	○	○	○

SECTION 5. OPTIONAL ACCESSORIES

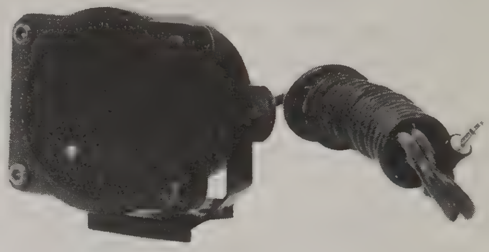
The following accessories are available for more sophisticated operation of your transceiver.

5-1 Fixed Station DC Power Supply KPS-12A

The KPS-12 DC power supply matches both the TR-7950 and TR-7930 while the KPS-7A matches the TR-7930.

5-2 SP-40 External Speaker

Designes primarily for mobile operation. Styling and tone quality match ytour tranceiver.



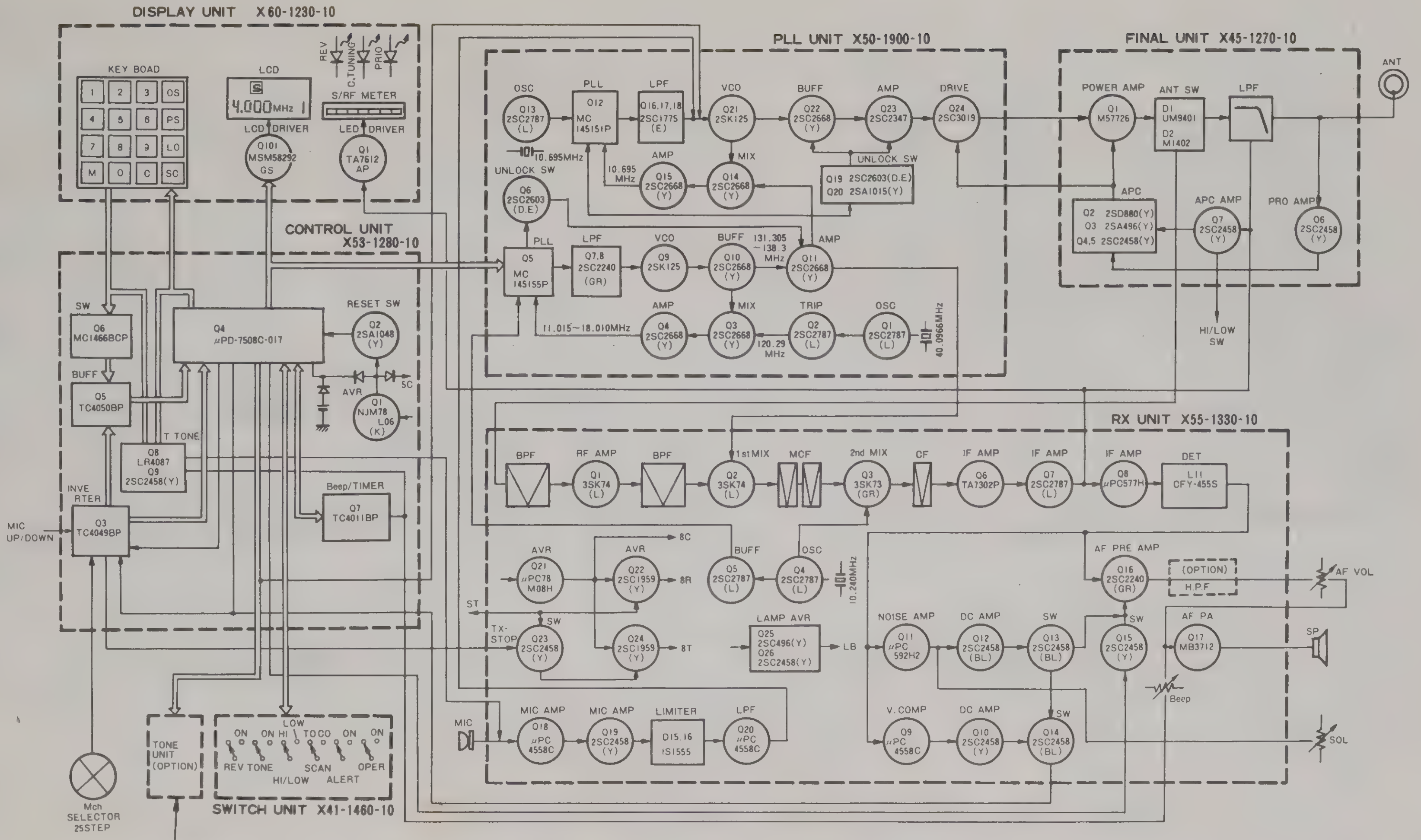
SP-40

5-3 TU-79 Tone Unit

MEMO

MEMO

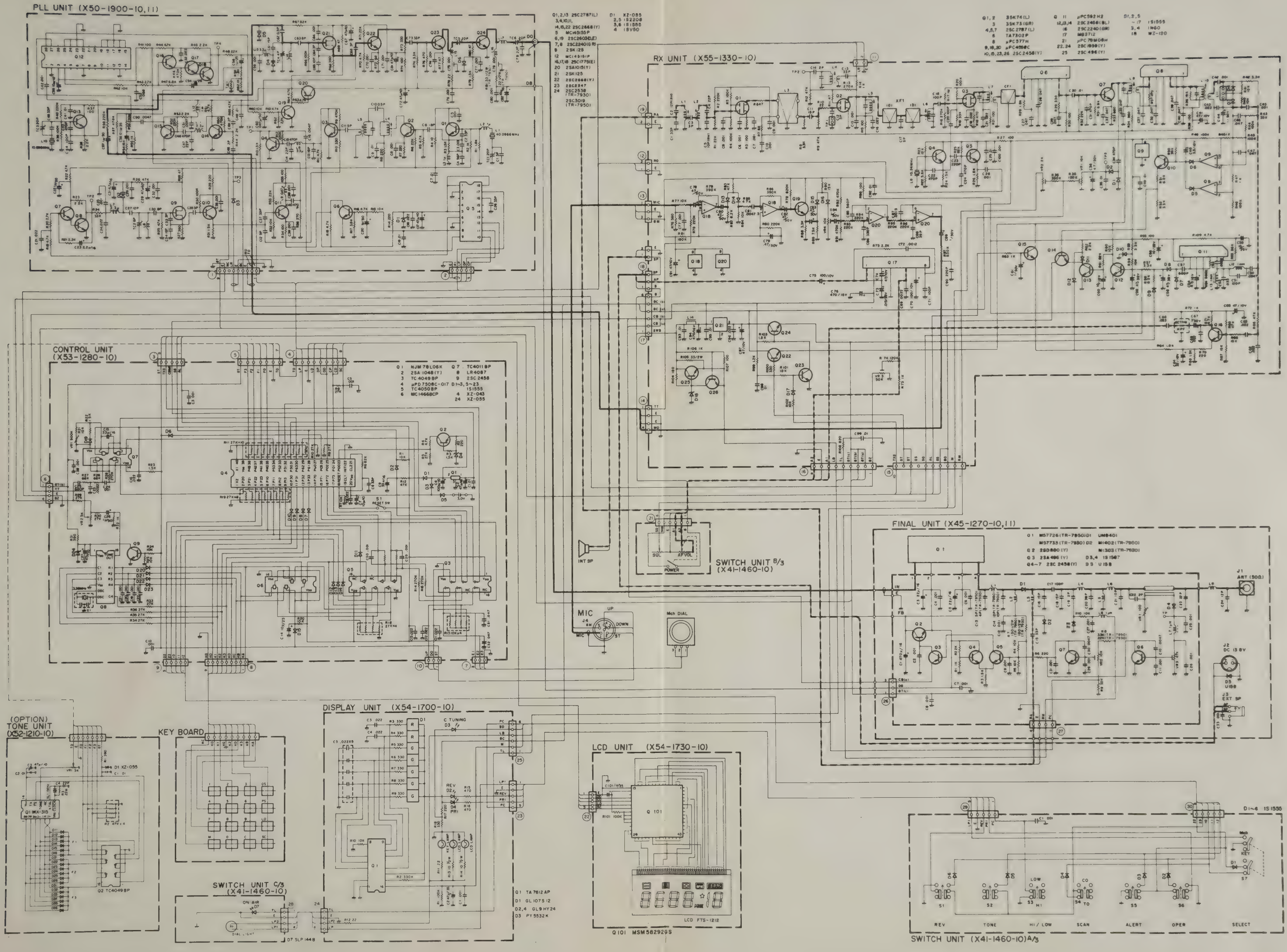
BLOCK DIAGRAM



Note: For the TR-7930, the following parts are subsitituted:
Q1 – M57737
Q24 – 2SC2538
D2 – M1303

MEMO

TR-7950/7930 SCHEMATIC DIAGRAM



Model TR-7950/TR-7930 ____________

Serial No. ____________

Date Purchase ____/____/____

Dealer Name ____________

____

____

____

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SERVICE MANUAL

TR-7950/TR-7930 TU-79

2m FM TRANSCEIVER

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SPECIFICATIONS

[General]

Semiconductors	MPU	1
	ICs	19
	Transistors	43
	FETs	5
	Diodes	61 (K) (M), 60(T), 59(w)
Frequency range	144.000 to 147.995 MHz (K) (M) 144.000 to 145.995 MHz (W) (T)	
Frequency synthesizer	Digital control, phase locked VCO	
Mode	FM (F3)	
Antenna impedance	50 ohms	
Power requirement	13.8V DC ±15%	
Grounding	Negative	
Operating temperature	–20°C to +50°C	
Current drain	0.5A in receive mode with no input signal (TR-7950) (Max.) 9.5A in HI transmit mode (TR-7930) (Max.) 6.5A in HI transmit mode (TR-7950) (Approx.) 3.0A in LOW transmit mode (TR-7930) (Approx.) 2.5A in LOW transmit mode	
Dimensions	175 mm (6 – 7/8) wide 64 mm (2 – 1/2) high 220 mm (8 – 11/36") deep (TR-7950), 206 mm (8 – 1/16") deep (TR-7930) (projections excluded)	
Weight	1.9 kg (4.18 lb) (TR-7950) 1.8 kg (3.96 lb) (TR-7930)	

[Transmitter Section]

RF output power (at 13.8V DC, 50Ω load)	HI	45 Watts min. (TR-7950) 25 Watts min. (TR-7930)
	LOW	3 ~ 7W (TR-7950) 2 ~ 6W (TR-7930)
Modulation	Phase shift	
Frequency tolerance (–20°C ~ +50°C)	Less than $\pm 15 \times 10^{-6}$	
Spurious radiation	HI	Less than –70 dB
	LOW	Less than –60 dB
Maximum frequency deviation (FM)	±5 kHz	
Microphone	Dynamic microphone with PTT switch, 500Ω	

[Receiver Section]

Circuitry	Double superheterodyne	
Intermediate frequency	1st IF	10.695 MHz
	2nd IF	455 kHz
Receiver sensitivity	Better than 30 dB for 0.5 µV S+N/N Better than 12 dB for 0.25 µV SINAD	
Receiver selectivity	More than 12 kHz (–6 dB) Less than 24 kHz (–60 dB)	
Spurious response	Better than 70 dB	
Squelch sensitivity	Less than 0.16 µV (threshold)	
Auto scan step level	Less than 0.2 µV (threshold)	
Audio output	More than 2.0 watts across 8 ohms load (5% dist.)	

Note: Circuit and ratings are subject to change without notice due to developments in technology.

K_1,M_1,T_1,W_1 : TR-7950 (45W Type)
K_2,M_2,T_2,W_2 : TR-7930 (25W Type)
N : New Parts

SEMI CONDUCTOR

Item	Name	Remarks
Diode	1N60	
	1S1555	
	1S1587	
	1S2208	
	1SV50	
	MI308	
	MI303	
	U15B	
	UM9401	
Zener Diode	WZ-120	
	XZ-043	
	XZ-055 K,M	
	XZ-060 T,W	
Thermistor	112-102-2	
LCD	FTS1212	N
LED	GL107S12	N
	GL9HY24	N
	PY5532K	
	SLP144B	
TR	2SA496 (Y)	
	2SA1015 (Y)	
	2SA1048 (Y)	
	2SC945 (Q)	
	2SC1675 (L)	
	2SC1775 (E)	
	2SC1815 (Y)	
	2SC1815 (BL)	
	2SC1959 (Y)	
	2SC2240 (GR)	
	2SC2347	
	2SC2458 (Y)	
	2SC2458 (BL)	
	2SC2538-22-A K_2,M_2,T_2,W_2	
	2SC2603 (D,E)	
	2SC2668 (Y)	
	2SC2787 (L)	
	2SC3019 K_1,M_1,T_1,W_1	N
	2SD880 (Y)	
FET	2SK125	
	3SK73 (GR)	
	3SK74 (L)	
IC	AFG05F1750A2 T,W	
	LR4087 K,M	N
	MB3712	
	MC14066BCP	
	MC145155P *K	
	MC145151P	N
	NJM78L06K	
	MK5087N K,M	
	MSM58292GS	N
	TA7302P	
	TA7612AP	
	TC4011BP	
	TC4049BP	
	TC4050BP	N
	UPC577H	
	UPC592H2	N
	UPC78M08H	
	UPC4558C	
Micro-processor	UPD7508C-017	N
Power Module	M57726 K_1,M_1,T_1,W_1	
	M57737 K_2,M_2,T_2,W_2	N

CIRCUIT DESCRIPTION

The TR-7950 and TR-7930 are 2 meter high power FM amateur radio mobile transceivers.
The operating frequency is controlled in 5 kHz steps by a microcomputer-controlled PLL (Phase Locked Loop). An LCD (Liquid Crystal Display) indicates various information. Both models have 21 memory channels for storing operating frequencies. Operation is controlled by either the keyboard or memory channel selector. The keyboard is illuminated for night time operation. The memory channel knob perimeter lights memory channel recall operations. Repeater functions include programmable offset, manual offset select, reverse and two paired-channelmemories. Types K and M can be equipped with an optional plug-in subtone circuit which allows 3 preset tone signals to be stored and controlled from memory; these types also have a built-in touch tone encoder. Types T and W include a 1750 Hz tone burst circuit. The microcomputer (backed up by a built-in lithium battery) supports all control functions such as scanning and Up/Down tuning. These transceivers are also equipped with a "beep" tone generator and other accessory circuits.

[RX]

The antenna signal is fed to the RX unit from the diode T/R switch in the Final unit. The RX unit front end consists of a dual gate FET RF amplifier Q1: 3SK74, first mixer Q2, a helical resonator and a 2-stage MCF (Monolithic Crystal Filter). This front end has high dynamic range and sensitivity.
The 10.695 MHz 1st IF signal from the MCF is mixed with the 10.24 MHz 2nd local signal by the 2nd mixer, Q3: 3SK73 and converted to a 455 kHz signal. This 455 kHz signal is applied through ceramic filter CF1 (CFW-455F) to the IF amplifiers Q6: TA7302P, Q7: 2SC2787, and Q8: μPC577H. The amplified and limited signal is detected by ceramic discriminator L11. The 10.24 MHz 2nd local oscillator signal is also sent to the PLL unit for use as the reference signal.
The receiver detector output consists of three components: voice intelligence, noise and direct current.
The voice component, after de-emphasis, is preamplified by Q16: 2SC2240, and is then power amplified by Q17: MB3712 to drive the speaker.
The noise component is applied to a band pass filter to obtain noise at about 30 kHz. This filtered noise component is applied to noise amplifier Q11: μPC592H2, which provides the squelch operating singal. After detection by diodes D7 & D8, the signal is DC amplified by Q12 and Q13 for control of the AF preamplifier, Q16.
The direct current component is applied to window comparator Q9: μPC4558 which checks whether the signal being received is in the center of the receiver's pass band. An on-channel signal will be detected at or near zero DC volts, while a signal greater than +/– 2 kHz from channel-center will contain a polar DC component sufficient for comparator rejection. Both the comparator and squelch output signals are applies to a logic AND operation (Q14), and the C-TUNE indicator is lit when the resultant is true. The AND output is also sent to the Control unit as the scan stop (SS) signal.

Item	Rating
Nominal center frequency (*fo*)	10.695 MHz
Pass bandwidth	±7.5 kHz or more at 3 dB
Attenuation bandwidth	±25 kHz or less at 40 dB ±45 kHz or less at 60 dB
Guaranteed attenuation	1. 70 dB or more within ±1 MHz 2. Spurious level ∓ 40 dB or more at *fo* ~ *fo* + 500 kHz 3. Spurious level = 80 dB or more at *fo* – (910 kHz ±10 kHz)
Ripple	1.0 dB or less
Loss	1.5 dB or less
Impedance	3 kΩ/0 pF

Table 1. MCF (L71 - 0216 - 05) RX unit XF 1

Item	Rating
Nominal center frequency	455 kHz
6 dB bandwidth	± 6 kHz or more
50 dB bandwidth	± 12.5 kHz or more
Ripple (within 455 ±5 kHz)	3 dB or less
Loss	6 dB or less
Guaranteed attenuation (within 455 ±100 kHz)	35 dB or more
Input and output impedance	2.0 kΩ

Table 2. Ceramic filter (L72 - 0315 - 05) RX unit CF 1

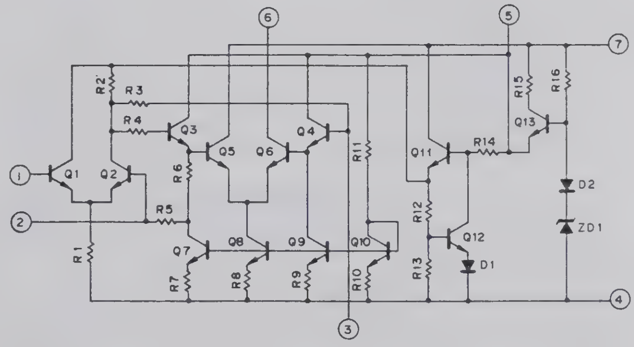


Fig. 1. TA7302P Equivalent circuit (RX unit Q6)

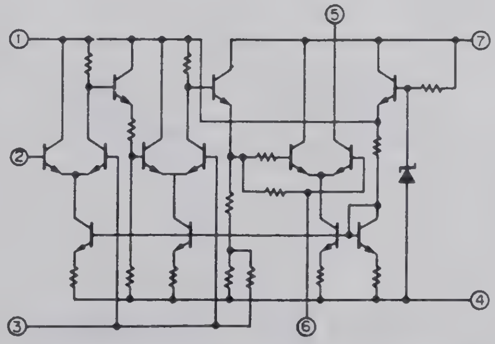


Fig 2. μPC577H Equivalent circuit (RX unit Q8)

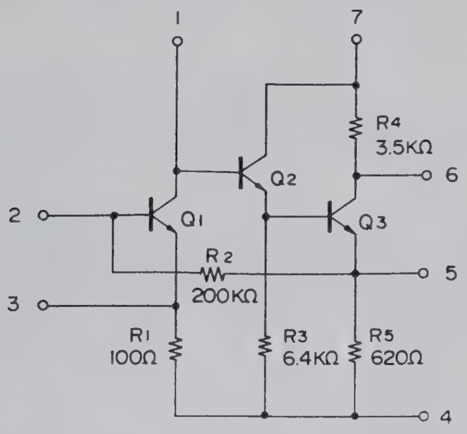


Fig 3. μPC592H2 Equivalent circuit (RX unit Q11)

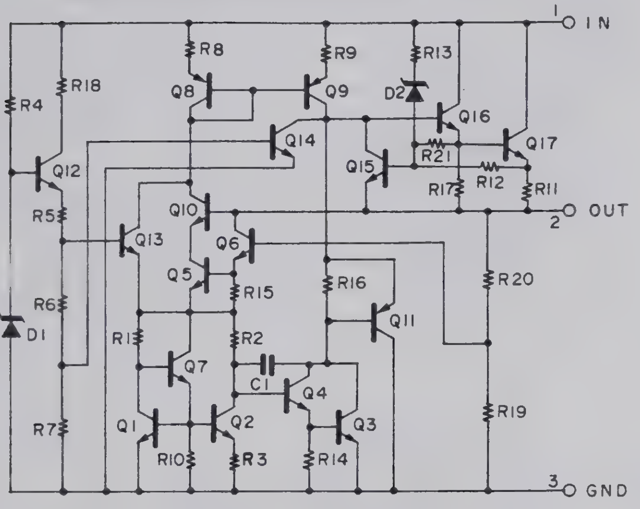


Fig 4. μPC78M08H Equivalent circuit (RX unit Q21)

[TX]

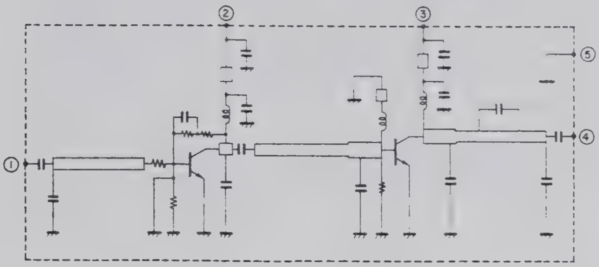
Audio from the microphone is amplified by Q18: μPC4558C (in the RX unit), buffered by Q19: 2SC2458(Y) and limited by diodes D13 ~ D16 (1S1555's). High frequencies which may be included in the limited signal are eliminated by active low pass filter Q20: μPC4558C. The filtered signal is applied to the TX PLL loop (in the PLL unit) via the MO line to phase modulate the RF singal. The resultant FM signal is amplified by Q22: 2SC2668(Y), Q23: 2SC2347 and Q24: (2SC3019 for the 45W type and 2SC2538 for the 25W type) to drive the Final unit.

The DO input to the Final unit is power amplified by power hybrid Q1: (M57726 for the 45W type and M57737 for the 25W type), then fed to the antenna through the T/R switch (D1 and D2) and low pass filter.

The APC (Automatic Power Control) circuit switches the output power between high and low to protect the final unit as follows. The output from the power hybrid is detected by diode D3, and the detected signal is amplified by Q7: 2SC2458(Y), which is controlled by the Hi/Low switch setting. Q7's output is applied to differential amplifier Q4 and Q5: 2SC2458(Y)'s. The reflected power from the antenna is detected by diode D4, amplified by Q6: 2SC2458(Y), and also applied to the differential amplifier. The differential amplifier's output is applied to regulators Q3: 2SA1015(Y) and Q2: 2SD880(Y) and to the collector of Q24 in the PLL unit to control transmitter output by reducing the voltage applied to Q1 pin 2 (DB).

Item	Symbol	Tc (°C)	Condition	Rating
Operating	Vcc	25		17V
DC current	Icc	25		7A
Operating case temp.	Tc (op)		-30 ~ +110°C	
Storage temp.	Tstg		-40 ~ +110°C	
Power input	Pin	25	Zg=Zl=50Ω	0.4W
Power output	Po	25	Zg=Zl=50Ω	40W

Table 3. Max rating M57737 (TR-7930)



① INPUT ② VCC1 ③ VCC2 ④ OUT ⑤ GND

Fig 5. M57737 Equivalent circuit (TR-7930)

MAX ratingM57726

Item	Symbol	Tc (°C)	Rating
Operating voltage	Vcc	25	17V
DC current	Icc	25	14A
Operating case temp	Tc (op)		−30 ~ +110 C
Storage temp	Tstg		−40 ~ +110 C

Electrical characteristic M57726

Item	Symbol	Tc (°C)	Condition	Value	
				Min	Typ
Power output	P_0	25	Vcc = 12.5V, F = 144 ~ 148 MHz Pin = 0.4W, ZL = ZG = 50Ω	43W	47W
Total efficiency	η_T	25	Vcc = 12.5V, F = 144 ~ 148 MHz Pin = 0.4W, ZL = ZG = 50Ω	50%	54%

Table 4. M57726 (TR-7950)

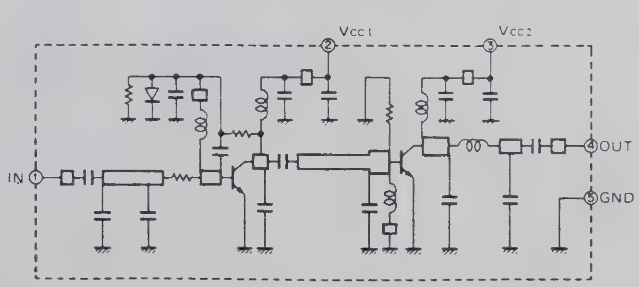


Fig 6. M57726 Equivalent circuit (TR-7950)

[PHASE LOCK LOOP UNIT]

The PLL unit contains two separate PLL circuits, an RX PLL and a TX PLL.

- RX PLL

  The signal generated by RX VCO (Voltage Controlled Oscillator) Q9: 2SK125 is buffered by Q10: 2SC2668(Y) and mixed with the HET (Heterodyne) signal by Q3: 2SC2668(Y) to obtain an 11.015 – 18.010 MHz (K, M) or 13.015 – 15.010 MHz (W, T) PLL IF signal. This signal is amplified by Q4: 2SC2668(Y) and applied to PLL IC Q5: MC145155P, where it is divided according to frequency division data sent from the Control unit to obrain a 5 kHz comparison signal. This is compared with the 5 kHz reference signal obtained by division of the 10.240 MHz reference signal originating in the RX unit. The comparator's output is applied to active low pass filter Q7 and Q8: 2SC2240GR, and then to varicap diode D2 (1S2208) to lock the VCO to the desired frequency.

  If the PLL should unlock, Q5 outputs an unlock signal. The signal turns off Q6 to interrupt operation of output amplifier Q11: 2SC2668(Y), and prevents receiver operation by removing the first mixer injection signal.

  Q1: 2SC2787L generates a 40.0966 MHz signal which is tripled by Q2 to obtain the 120.29 MHz HET signal for application to mixer Q3.

- TX PLL

  The signal generated by TX VCO Q21: 2SK125 is mixed with the RX PLL output by Q14: 2SC2668(Y) to obtain the 10.695 MHz TX IF signal. This is amplified by Q15: 2SC2668(Y) and applied to PLL IC Q12: MC145151P.

  In this PLL IC, the 10.695 MHz signal is divided by 512 to obtain a 20.88 kHz signal, and this is compared with the 20.88 kHz reference signal obtained by division of the 10.695 MHz reference signal generated by Q13: 2SC2787L. This design reduces the TX PLL response time. Q12's comparator output is actively low pass filtered by Q16, Q17 and Q18: 2SC1775E and applied to varicap diode D5 (1S2208). This locks the TX VCO to a frequency which is 10.695 MHz higher than the RX PLL frequency.

  If the TX PLL unlocks, the bias voltage supplied by Q19 & Q20 to Q22, Q23 and Q24 is turned off to disable transmission.

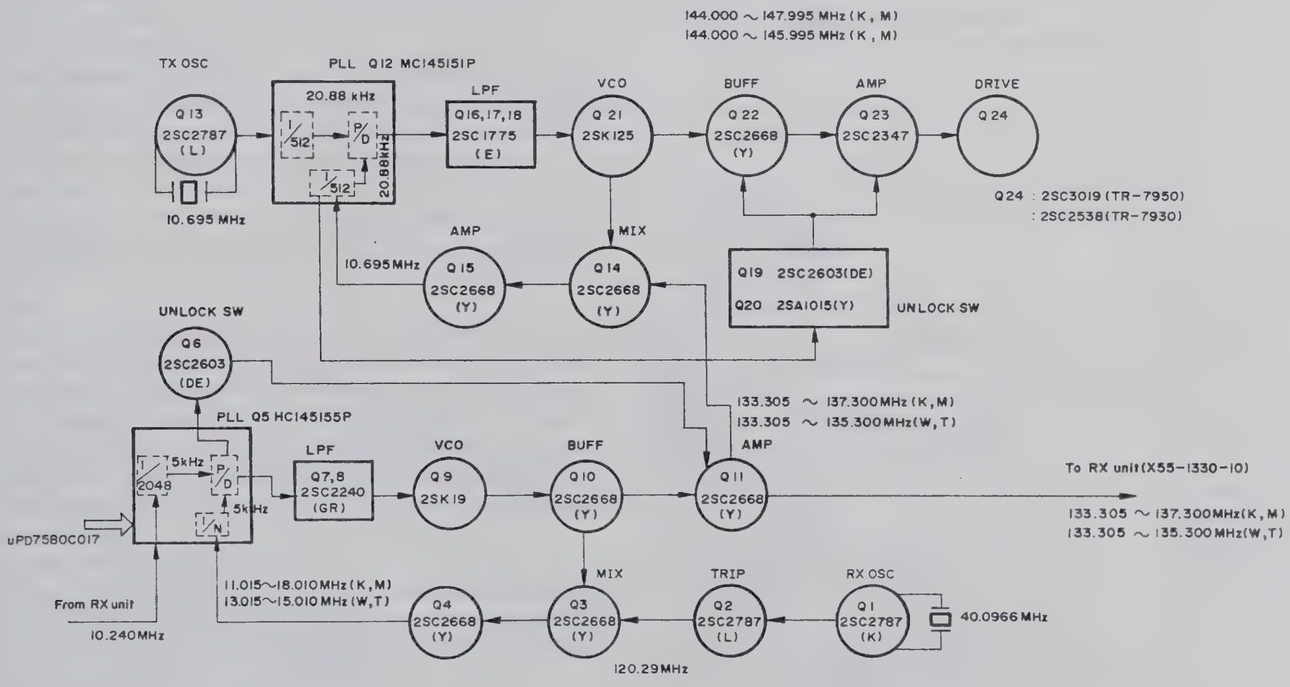


Fig. 7. PLL Block diagram

[Control Unit (X53-1180-10)]

An LCD (Liquid Crystal Display) indicates both the operating frequency in four digits and the memory channel in one of two digits. This LCD is statically driven.

(1) LCD data output

Q4, The microcomputer, sends serial data for the LCD to Q101: MSM58292GS in the LCD unit through three data lines.

(2) PLL data output

The microcomputer also sends division serial data for PLL operation to Q5 in the PLL unit through three data lines. Two of these data lines, SERIAL DATA and CLOCK, are also used as LCD data lines.

(3) Keyboard

The keyboard switches are scanned by the microcomputer; pulse signals are output from ports P30 ~ P33 and the return pulses are received at ports P10 ~ P13. During transmission, receive ports P10 ~ P13 are disconnected via bilateral switch Q6: MC14066BCP. This allows keyboard control of Q8: LR4087, the DTMF (Dual Tone Multi Frequency) generator during transmission without disturbing frequency setting. The return pulse signals are shaped by Q5: TC4050BP before being fed back to the microcomputer.

(4) Switches (Switch unit)

Switches are scanned by the microcomputer; scan pulse signals are output from ports P22 and P23 and the return pulses are received at ports P10 ~ P12.

(5) Rotary Encoder (M. CH)

The rotary encoder signals are applied via the E1 & E2 lines to Q3: TC4049BP, then Q5: TC4050BP. These ICs shape the signal waveform to reduce chattering, etc. These are input to microcomputer ports P72 and P73 for processing.

(6) Up/Down

The Up/Down signals from the microphone are inverted by Q3: TC4049BP, then applied to microcomputer ports P70 and P71.

(7) Scan

The squelch stop signal from the RX unit is applied to microcomputer port P61. This signal is also applied to R12 and C9, the delay circuit which determines the scan hold time. This is inverted by Q3: TC4049BP and applied to microcomputer port P62 . One-half of Q7: TC4011BP is a monostable vibrator used to adjust (with VR1) scan resume timing. The trigger pulse for the vibrator is output from microcomputer port P53.

(8) "Beep" tone generator

The "beep" tone is generated by an astable vibrator, the other one half of Q7: TC4011BP. The switching signal for the vibrator is output from microcomputer port P20. Tone frequency is determined by R28 and C24.

(9) Backup circuit

The voltage output from Q1, the AVR (Automatic Voltage Regulator) is applied to microcomputer switching input port P00 through Q2: 2SA1048(Y). When the AVR output voltage drops to the lithium backup battery voltage, the level at P00 goes L to start backup and stop the clock signal.

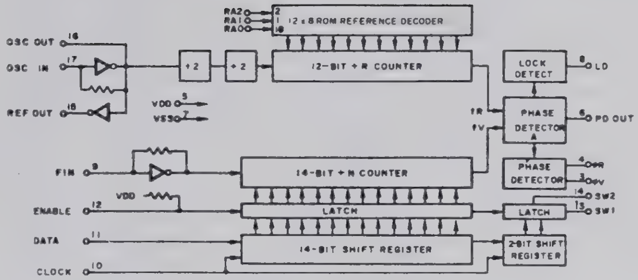


Fig. 8. MC145155P (PLL unit Q5)
Serial input PLL freq. synthesizer

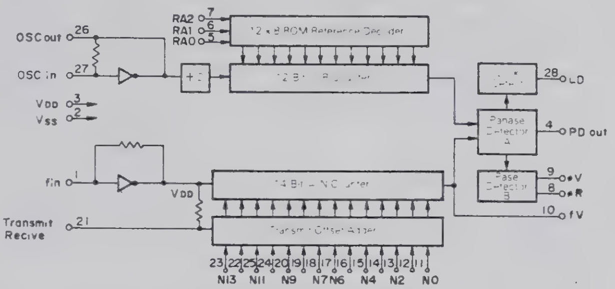


Fig. 9 MC145151P (PLL unit Q12)
Parallel input PLL freq. synthesizer

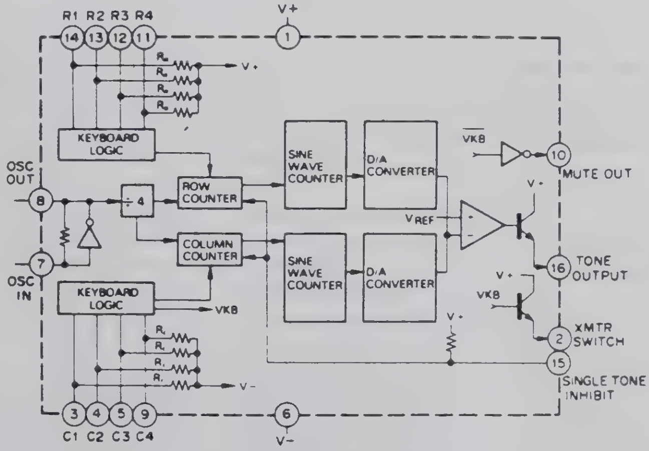


Fig. 10. MK5087N, LR4087 (Control Unit Q8)
K only

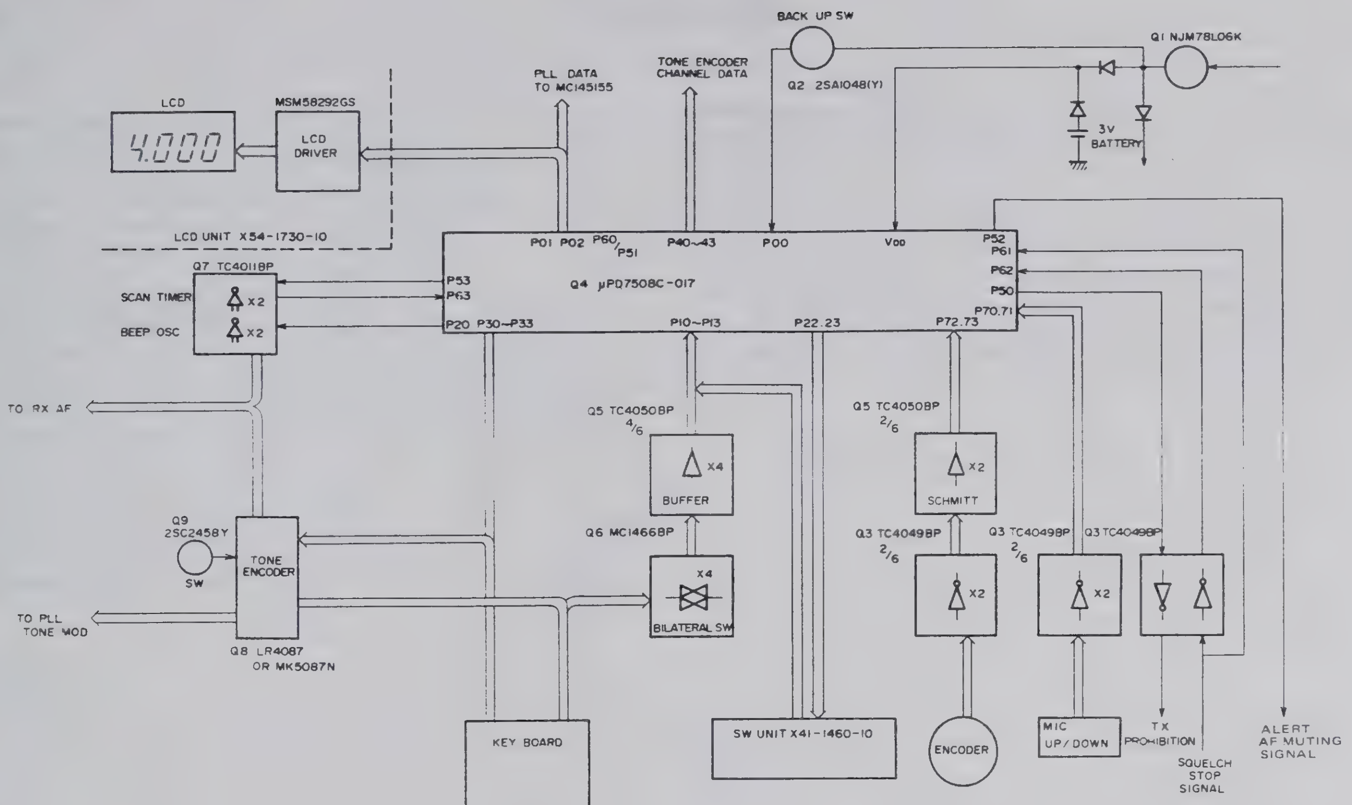


Fig. 11. Control Unit Block Diagram

TERMINAL FUNCTION OF μPD 7508C-017

Terminal No.	Symbol	Function	Input	Output
1	X2	Open		
2	P20/$\overline{\text{PSTB}}$	"Beeper" switching		○
3	P21/PTOUT	SCAN pulse		○
4	P22	SW SCAN pulse		○
5	P23	SW SCAN pulse		○
6	P10	KEY return and SW return (KA)	○	
7	P11	KEY return and SW return (KB)	○	
8	P12	KEY return and SW return (KC)	○	
9	P13	KEY return and SW return (KD)	○	
10	P30	KEY scan (K0)		○
11	P31	KEY scan (K1)		○
12	P32	KEY scan (K2)		○
13	P33	KEY scan (K3)		○
14	P70	MIC up SW input	○	
15	P71	MIC down SW input	○	
16	P72	Encoder E2	○	
17	P73	Encoder E1	○	
18	RESET	Reset input	○	
19	CL1	Clock		
20	VDD	Power supply		

Terminal No.	Symbol	Function	Input	Output
21	CL2	Clock		
22	INT 1	GND		
23	P00/INT 0	Back up information input	○	
24	P01/$\overline{\text{SCK}}$	PLL Display serial data		○
25	P02/SO	PLL Display		○
26	P03/SI	TX/RX input RX: H, TX: L	○	
27	P60	LCD Driver Load of MSM58292GS		○
28	P61	SCAN stop signal	○	
29	P62	SCAN stop delay signal	○	
30	P63	SCAN timer input signal	○	
31	P50	TX inhibit signal		○
32	P51	PLL MC145155 Load signal		○
33	P52	ALERT audio mute signal		○
34	P53	SCAN Timer trigger pulse		○
35	P40	TONE ON/OFF data		○
36	P41	TONE channel data F1		○
37	P42	TONE channel data F2		○
38	P43	TONE channel data F3		○
39	VSS	GND		
40	X1	GND		

PARTS LIST

CAPACITORS

CC 45 TH 1H 220 J
1 2 3 4 5 6

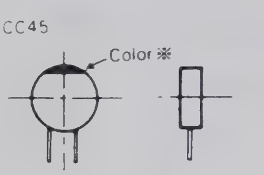
1 = Type ... ceramic, electrolytic, etc
2 = Shape ... round, square, etc
3 = Temp coefficient
4 = Voltage rating
5 = Value
6 = Tolerance

● Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color ※	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm ℃	0	−80	−150	−220	−330	−470	−750

2nd Word	G	H	J	K	L
ppm/℃	±30	±60	±120	±250	±500

Example CC45TH = −470 ± 60ppm/℃



● Rating voltage

2nd word / 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	–
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	–
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	–

● Capacitor value

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001μF
1 0 3 = 0.01μF
2 2 0 = 22pF
1st number
2nd number
Multiplier

● Tolerance

Cord	C	D	G	J	K	M	X	Z	P	No cord
(%)	±0.25	±0.5	±2	±5	±10	±20	+40 −20	+80 −20	+100 −0	More than 10μF −10 ~ +50 Less than 4.7μF −10 ~ +75

Less than 10 pF

Cord	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

Resistors not listed in this parts list are standard, fixed carbon composition, 1/4W or 1/8W.
The resistance values, in ohms, are indicated on the schematic diagram.

Abbreviation		Abbreviation	
Cap	Capacitor	ML	Mylar
C	Ceramic	S	Styren
E	Electrolytic	T	Tantalum
MC	Mica		

TR-7950 : K_1,M_1,T_1,W_1
TR-7930 : K_2,M_2,T_2,W_2
$K = K_1,K_2$ $M = M_1,M_2$
$T = T_1,T_2$ $W = W_1,W_2$

Symbol	Destination
K	U.S.A.
W	Europe
T	Britain
M	General market

N : New Parts

Part No.	Re-marks	Description
GENERAL		
A01-0932-03	N	Case (A)
A01-0933-03	N	Case (B)
A13-0612-02		Angle Assy (Right)
A13-0613-02		Angle Assy (Left)
A13-0614-04		Mounting hardware
A20-2454-13	N	Panel (TR-7950) K_1,M_1,T_1,W_1
A20-2455-13	N	Panel (TR-7930) K_2,M_2,T_2,W_2
B05-0701-04		Speaker grill cloth
B05-0713-04		Grill cloth
B40-2620-04	N	Name plate K_1,M_1
B40-2621-04	N	Name plate T_1
B40-2622-04	N	Name plate W_1
B40-2623-04	N	Name plate K_2,M_2
B40-2624-04	N	Name plate T_2
B40-2625-04	N	Name plate W_2
B43-0680-04	N	Badge K,M,W
B43-0681-04	N	Badge T
B46-0058-10		Warranty card K
B50-3993-00	N	Instruction manual K
B50-3994-00	N	Instruction manual T
B50-3995-00	N	Instruction manual W
B50-4004-00	N	Instruction manual M
E06-0651-05		6P Metal socket (MIC)
E07-0252-05		2P Connector
E07-0651-05		6P Metal consent
E12-0001-15		Phone plug

PARTS LIST

Part No.	Re-marks	Description
E30-1674-05		DC Cord assy (TR-7930) K_2,M_2,T_2,W_2
E30-1685-05		DC Cord assy (TR-7950) K_1,M_1,T_1,W_1
E31-0456-05		Connector with lead line (SP)
F05-1031-05		Fuse, 10A × 2 (TR-7950) K_1,M_1,T_1,W_1
F05-8021-05		Fuse, 8A × 2 (TR-7930) K_2,M_2,T_2,W_2
G02-0505-05		Knob fixed spring, (VOL)
G09-0411-05		Knob fixed spring, (SQL)
G53-0511-04		Packing, (Case) × 8
H01-4437-03	N	Packing carton K_1,M_1,W_1
H01-4438-03	N	Packing carton T_1
H01-4439-03	N	Packing carton K_2,M_2,W_2
H01-4440-03	N	Packing carton T_2
H10-2501-03		Packing fixture
H25-0049-03		Accessory bag
H25-0079-04		Protective bag, MIC
H25-0103-04		Protective bag, Cord
H25-0106-04		Protective bag, TR-7950/30
J02-0069-05		Rubber foot × 2 (Accessory)
J02-0070-05		Foot × 2 (Accessory)
J21-2501-14		SP mounting hardware
J61-0401-05		Nylon band × 3
K21-0767-03	N	Main knob, M. CH
K23-0735-04		Knob, SQL
K23-0754-04	N	Knob, VOL
K27-0435-04	N	Push knob × 6
N09-0008-04		Ornamental screw × 4 (Accessory)
N09-0256-05		Gnd screw, MIC
N14-0510-04		Flang nut × 4 (Accessory)
M15-1040-46		Washer × 4 (Accessory)
N15-1060-46		Washer × 4 (Accessory)
N16-0060-46		Spring washer × 4 (Accessory)
N30-2006-46		Round head screw, ON AIR PC board
N30-3006-41		Round head screw × 2 (Accessory foot)
N30-3008-41		Round head screw × 2 (Accessory foot)
N32-3006-46		Flat head screw × 8, Sub panel·Heat sink
N33-3006-45		Round flat head screw × 18, Case·Side escutioen
N35-3006-46		Bind screw × 4, Panel
N87-2606-46		Self tapping screw × 4, SW unit
N87-3006-46		Self tapping screw × 20, PC board
N99-0304-04		Hex. head screw × 4
S50-1406-05		Micro switch × 2
T03-0027-15		Speaker
T91-0311-05		Microphone (TRIO) T
T91-0313-05		Microphone (KENWOOD) K,M,W
W01-0401-05		Hexagonal wrench (Accessory)
W02-0315-05		Rotary encoder
W09-0323-05		Lithium battery (CR2032)
X41-1460-10	N	Switch unit K,M
X41-1460-51	N	Switch unit T
X41-1460-61	N	Switch unit W
X45-1270-10	N	FINAL unit (TR-7950) K_1,M_1,T_1,W_1
X45-1270-11	N	FINAL unit (TR-7930) K_2,M_2,T_2,W_2
X50-1900-10	N	PLL unit (TR-7950) K_1,M_1,T_1,W_1
X50-1900-11	N	PLL unit (TR-7930) K_2,M_2,T_2,W_2

Part No.	Re-marks	Description
X53-1280-10	N	Control unit K,M
X53-1280-61	N	Control unit T,W
X55-1330-10	N	RX unit K,M
X55-1330-51	N	RX unit T
X55-1330-61	N	RX unit W
X60-1230-10	N	Display assy unit

Part No.	Re-marks	Description	Ref. No.	Q'ty
SWITCH Unit (X41-1460-10, 61, 51)		10 : K,M 51: T 61: W		
B30-0828-05	N	Lamp with cap		1
CK45B1H102K		C, 0.001	C1	1
E40-0673-05		Connector (6P)		1
R19-9408-05	N	Pot. with SW, 10K(K), 50K(B)	S8	1
R92-0150-05		Jumper wire K,M,W		1
S36-2410-05	N	See saw switch	S7	1
S40-2438-05	N	Push switch K,M,W	S1,3,4,5,6	5
S40-2438-05	N	Push switch T	S1,2,3,4,5,6	6
S40-2439-05	N	Push switch K,M,W	S2	1
FINAL Unit (X45-1270-10, 11)		10: TR-7950 11: TR-7930		
CC45CH1H020C		C, 2P ±0.25P	C19,22	2
CC45CH1H330J		C, 33P	C15	1
CC45SL2H040C		C, 4P ±0.25P K_2,M_2,T_2,W_2	C13	1
CC45SL2H050C		C, 5P ±0.25P K_1,M_1,T_1,W_1	C13	1
CC45SL2H100D		C, 10P ±0.5P K_1,M_1,T_1,W_1	C21	1
CC45SL2H100D		C, 10P ±0.5P K_2,M_2,T_2,W_2	C14,21	2
CC45SL2H101J		C, 100P	C17	1
CC45SL2H120J		C, 12P K_2,M_2,T_2,W_2	C24	1
CC45SL2H120J		C, 12P K_1,M_1,T_1,W_1	C14,24	2
CC45SL2H150J		C, 15P	C16,18	2
CC45SL2H220J		C, 22P	C23	1
CC45SL2H390J		C, 39P	C20	1
CE04W1C220M		E, 22 16V	C3,5	2
CK45B1H102K		C, 0.001	C2,4,6,7,8,9 11,12,25,26 27,29,31,33	14
C90-0820-05		E, 470 16V	C1	1
C91-0105-05		C, 0.0047	C10,30	2
E04-0152-05		UHF type receptacle		1
E06-0252-05		2P Metal socket (power supply)		1
E11-0403-05		Phone jack		1
E23-0046-04		Square terminal		6
E23-0047-04		Square terminal		1
E31-2065-05		Cable with terminal (B)		1
E40-0373-05		Mini connector, 3P		1
E40-0473-05		Mini connector, 4P		1
F20-0516-05		Insulating sheet		1
F29-0014-03		Shoulder washer		1
L34-0452-05		Coil (3ϕ, 6T)	L4	1
L34-0692-05		VHF coil (5ϕ, 4T)	L3	1
L34-0742-05		Coil (3ϕ, 5T)	L6	1
L34-0822-05		VHF Coil (5ϕ, 3T)	L9	1

PARTS LIST

Part No.	Re-marks	Description	Ref. No.	Q'ty
L34-0908-05		Coil (3ϕ)	L2,5	2
L34-1020-05		Coil (3ϕ, 3.5T)	L1	1
L40-1091-03		Ferri-inductor (1µH)	L7,8	2
N09-0256-05		Gnd screw		1
N30-3006-46		Round Screw		1
N35-3008-46		Bind screw		2
N87-3006-46		Screw		5
R12-0408-05		Trim.pot. 100Ω	VR1	1
R12-3054-05		Trim.pot. 47kΩ	VR3	1
R12-3419-05		Trim.pot. 10kΩ	VR2	1
R92-0150-05		Jumper wire		4
RC05GF2H151J		Resister 150Ω ± 5% 1/2W K_1,M_1,T_1,W_1	R7	1
RC05GF2H181J		Resister 180Ω ±5% 1/2W K_2,M_2,T_2,W_2	R7	1
PLL Unit (X50-1900-10, 11)		**10: TR-7950 11: TR-7930**		
C05-0030-15		Ceramic trimmer, 20P	TC1,3,5,6	4
C05-0062-05		Ceramic trimmer, 6P	TC2	1
C05-0308-05		Ceramic trimmer, 4P	TC4	1
CC45CH1H020C		C, 2P±0.25P	C46,69	2
CC45CH1H030C		C, 3P±0.25P	C1,33,35,64 68	5
CC45CH1H050C		C, 5P±0.25P	C11,12	2
CC45CH1H0R5C		C, 0.5P±0.25P	C10,62	2
CC45CH1H080D		C, 8P±0.5P	C30,63	2
CC45CH1H100D		C, 10P±0.5P	C65	1
CC45CH1H101J		C, 100P	C44	1
CC45CH1H120J		C, 12P	C27,	1
CC45CH1H150J		C, 15P	C34,61	2
CC45CH1H180J		C, 18P	C6,13	2
CC45CH1H220J		C, 22P	C14,47,79	3
CC45CH1H330J		C, 33P	C2,26,37,45 73	5
CC45SH1H560J		C, 56P	C4	1
CE04W1A470M		E, 47 10V	C17,28,67,72 81	5
CE04W1C100M		E, 10 16V	C55,82	2
CE04W1H010M		E, 1 50V	C20,22,57	3
CE04W1HR47M		E, 0.47 50V	C60	1
CK45B1H102K		C, 0.001	C3,5,8,25,29 32,36,38,39 42,59,66,70 71,74,76,77 80	18
CK45B1H471K		C, 470P	C15,40,43,48	4
CQ92M1H223K		ML, 0.022	C21,24	2
CQ92M1H683K		ML, 0.068	C52	1
CS15E1C2R2M		T, 2.2 16V	C23	1
CS15E1C4R7M		T, 4.7 16V	C31	1
CS15E1E010M		T, 1 25V	C54,58	2
CS15E1V0R1M		T, 0.1 35V	C56	1
C90-0804-05		Cap. 0.001	C75,78	2
C91-0105-05		C, 0.0047	C16,50,51	3
C91-0131-05		C, 0.01	C7,9,19,41 49	5
C91-0457-05		C, 0.022	C18,53	2
E04-0154-05		Coax. connector DO		1
E40-0573-05		Mimi connector, 5P		1
E40-0973-05		Mini connector, 9P		1
L32-0654-05	N	VCO coil ($4^3/_4$T)	L8	1
L32-0655-05	N	VCO coil (3/4T)	L14	1
L33-0002-05		Choke coil (1µH)	L2,3	2
L33-0605-05		Choke coil (0.47µH)	L9	1
L34-0452-05		Coil A (3ϕ 6T) K_2,M_2,T_2,W_2	L16	1
L34-0742-05		Coil A (3ϕ 5T) K_2,M_2,T_2,W_2	L17	1
L34-0742-05		Coil A (3ϕ 5T) K_1,M_1,T_1,W_1	L16,17	2
L34-0902-05		VHF coil	L15	1
L34-2035-05		Tuning coil	L4,5	2
L40-1021-03		Ferri-inductor (1µH)	L12	1
L40-3391-03		Ferri-inductor (3.3µH)	L6,11,13	3
L77-0975-05	N	Crystal (40.0966MHz)	L1	1
L77-0976-05	N	Crystal (10.695MHz)	L10	1
RC05GF2H220J		Resister 22Ω ±5% K_1,M_1,T_1,W_1	R81	1
RC05GF2H330J		Resister 33Ω ±5% 1/2W K_2,M_2,T_2,W_2	R81	1
R92-0150-05		Jumper wire		8
CONTROL Unit (X53-1280-10, 61)		**10: K,M 61: T,W**		
CC45CH1H330J		C, 33P	C6	1
CE04W1A101M		E, 100 10V	C4	1
CE04W1A470M		E, 47 10V K,M	C27	1
CE04W1C330M		E, 33 16V	C9,15	2
CE04W1C470M		E, 47 16V	C2	1
CE04W1E100M		E, 10 25V	C14	1
CE04W1H010M		E, 1 50V K,M	C26	1
CK45B1H102K		C, 0.001 T,W	C3,5,10,28 29,30	6
		K,M	C3,5,10 19~22,28,29,30	10
CK45B1H681K		C, 680P	C25	1
CQ92M1H102K		ML, 0.001	C24	1
CQ92M1H222K		ML, 0.0022	C23	1
CS15E1A100M		T, 10 10V	C7	1
C91-0131-05		C, 0.01	C1	1
C91-0456-05		C, 0.047	C31,32	2
C91-0457-05		C, 0.022	C8,11,12,13 16	5
E40-0373-05		Mini connector 3P	J7,10	2
E40-0473-05		Mini connector 4P	J6	1
E40-0573-05		Mini connector 5P	J3,9	2
E40-0773-05		Mini connector 7P	J5	1
E40-0973-05		Mini connector 9P	J4,8	2
L78-0003-05		Ceramic oscillator (3.58MHz) K,M	X1	1
R12-2411-05		Trim pot (5kΩ) K,M	VR2	1
R12-7406-05	N	Trim pot (500kΩ)	VR1	1
R90-0515-05		Resistor block (10kΩ× 4)	R13	1
R90-0526-05		Resistor block (27kΩ× 4)	R18	1
R90-0557-05	N	Resistor block (27kΩ× 8)	R19	1
R90-0558-05	N	Resistor block (27kΩ× 10)	R11	1
S59-0415-05	N	Key board switch (Reset SW)	S1	1
RX Unit (X55-1330-10, 61,51)		**10: K, M 51: T 61: W**		
CC45CH1H020C		C, 2P ±0.25P	C14	1
CC45CH1H030C		C, 3P ±0.25P	C3	1
CC45CH1H050C		C, 5P ±0.25P	C17	1
CC45CH1H0R5C		C, 0.5P ±0.25P	C12	1
CC45CH1H150J		C, 15P	C11	1

PARTS LIST

Part No.	Re-marks	Description	Ref. No.	Q'ty
CC45CH1H220J		C, 22P	C4	1
CC45CH1H330J		C, 33P	C1,13	2
CC45RH1H100D		C, 10P ±0.5P	C5	1
CC45RH1H120J		C, 12P	C2	1
CC45SL1H101J		C, 100P	C18,20,71	3
CC45SL1H121J		C, 120P	C51	1
CC45SL1H221J		C, 220P	C23,90	2
CC45SL1H331J		C, 330P	C86	1
CC45SL1H390J		C, 39P	C88	1
CC45SL1H561J		C, 560P	C85	1
CE04W1A101M		E, 100 10V	C70,75	2
CE04W1A470M		E, 47 10V	C41,65,74,91 97	5
CE04W1E220M		E, 22 25V K,M	C64	1
		T,W	C64,201,202	3
CE04W1H010M		E, 1 50V	C44,61,67,84 89	5
CE04W1H100M		E, 10 50V	C55,56	2
CE04W1HR47M		E, 0.47 50V K,M	C78,79,80,82, 83	5
		T,W	C78,79,80,82 83,203	6
CE04W1H4R7M		E, 4.7 50V	C36	1
CK45B1H102K		C, 0.001	C6,7,8,9,10 15,26,77,100	9
CK45B1H222K		C, 0.0022	C69	1
CK45B1H471K		C, 470P	C22,24,31,34	4
CK45B1H681K		C, 680P	C57	1
CK45F1H103Z		C, 0.01 K,M	C49,92,93,95 98,99	6
		T,W	C49,92,93,95 98,99,205	7
CQ92M1H102K		ML, 0.001	C42,45	2
CQ92M1H103K		ML, 0.01	C30	1
CQ92M1H122K		ML, 0.0012	C72	1
CQ92M1H152K		ML, 0.0015	C87	1
CQ92M1H222K		ML, 0.0022	C53	1
CQ92M1H223K		ML, 0.022	C62,63,66	3
CQ92M1H333K		ML, 0.033 K,M	C52,68	2
		T,W	C52,68,204	3
CQ92M1H472K		ML, 0.0047	C50,81	2
CQ92M1H473K		ML, 0.047	C46,47,52	2
CS15E1A100M		T, 10 10V K,M,W	C60	1
		T	C60,207	2
CS15E1A220M		T, 22 10V T	C206	1
CS15E1A3R3M		T, 3.3 10V	C48	1
CS15E1A4R7M		T, 4.7 10V	C54	1
CS15E1VR47M		T, 0.47 35V	C58,59	2
C90-0820-05		E, 470 16V	C76,94	2
C90-0834-05		C, 0.15	C73	1
C91-0131-05		C, 0.01	C25,35	2
C91-0456-05		C, 0.047	C27,28,29,32, 33,37,38,39, 40	9
C91-0457-05		C, 0.022	C16,19,21,43 96	5
E40-0273-05		Mini connector 2P K,M	J11,12,19	4
		T,W	J11,12,19,20	5
E40-0373-05		Mini connector 3P	J13,18	2
E40-0473-05		Mini connector 4P	J14	1
E40-0673-05		Mini connector 6P	J17	1
E40-0973-05		Mini connector 9P	J16	1
E40-1073-05		Mini connector 10P	J15	1

Part No.	Re-marks	Description	Ref. No.	Q'ty
G09-0407-14		Gnd spring		1
L15-0016-05		Choke coil (Low frequency)	L14	1
L30-0005-05		IFT 10.7MHz	L5,6	2
L30-0199-05		IFT 455kHz	L9	1
L30-0503-05		IFT 455kHz	L7,10	2
L31-0267-05		ANT coil	L1,2	2
L34-0683-05		Tuning coil	L4	1
L40-1021-03		Ferri-inductor, 1mH	L12	1
L40-1021-25		Ferri-inductor, 1mH	L13	1
L71-0216-05		MCF, 10.695MHz	XF1	1
L72-0315-05		Ceramic filter, CFW455F	CF1	1
L77-0858-15		Crystal, 10.24MHz	L8	1
L79-0446-05		Ceramic discri, CFY455S	L11	1
L79-0468-05		Helical block T,W	L3	1
L79-0483-05		Helical block K,M	L3	1
N30-3004-46		Round screw		2
R12-1426-05	N	Trim. pot. 2kΩ	VR2	1
R12-3436-05		Trim. pot. 10kΩ	VR1,4	2
R12-3439-05	N	Trim. pot. 20kΩ T,W	VR5	1
R12-4412-05		Trim. pot. 50kΩ	VR3	1
R92-0150-05		Jumper wire K,M		22
		T		27
		W		28

Display assy Unit (X60-1230-10)

Part No.	Re-marks	Description	Ref. No.	Q'ty
B10-0652-04	N	Front glass		1
	N	LCD plate		1
	N	Connector with lead line		1
	N	Shadow mask		2
J21-2775-04	N	Mounting plate		1
N17-1020-46		Star washer		1
N89-2006-46		Tap tight screw		7
S59-0412-05	N	Key board assy		1
X54-1700-10	N	Display unit		1
X54-1730-10	N	LCD unit		1

Display Unit (X54-1700-10)

Part No.	Re-marks	Description	Ref. No.	Q'ty
B30-0827-05	N	Lamp		1
B30-0828-05		Lamp with cap		2
CK45B1H102K		C, 0.001	C1	1
CK45F1H103Z		C, 0.01		1
CS15E1VR47M		T, 0.47 35V	C2	1
C90-0560-05		Inline block 0.022 x 5	C5	1
C91-0457-05		C, 0.022	C3,4	2
				1
E40-0473-05		Mini connector 4P	J24	1
E40-0573-05		Mini connector 5P	J23	1
E40-0673-05		Mini connector 6P	J25	1
RC05GF2H100J		Resistor 10Ω, 1/2W	R13,14	2

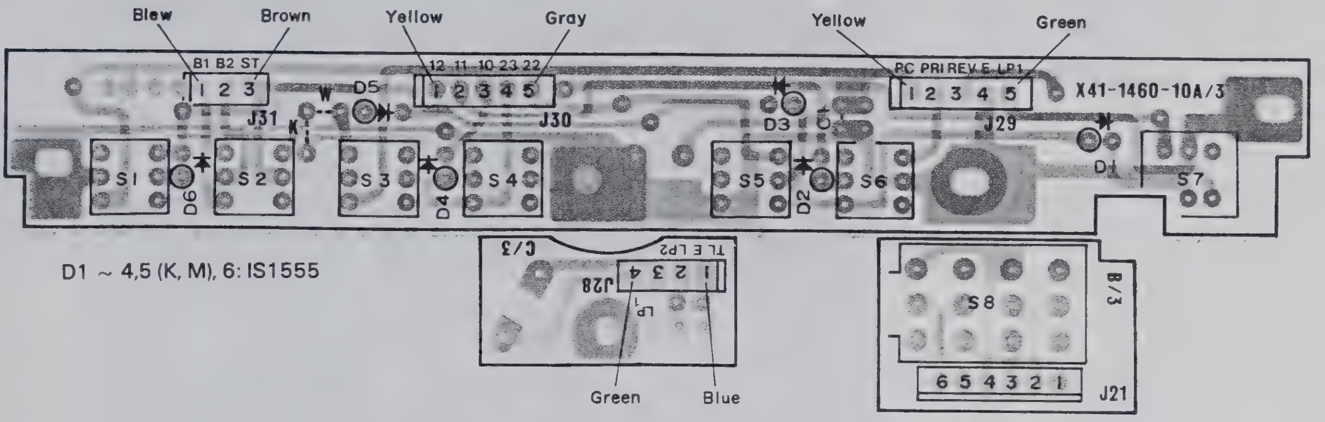
LCD Unit (X54-1730-10)

Part No.	Re-marks	Description	Ref. No.	Q'ty
CS15E1V0R1M		T, 0.1 35V	C101	1
E40-0573-05		Mini connector, 5P	J22	1

PC BOARD VIEWS

SWITCH UNIT (X41 - 1460 - 10,61,51)

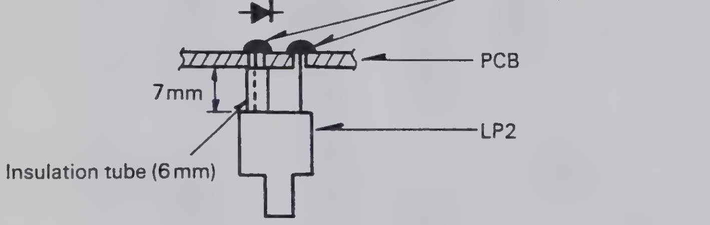
Component Side View



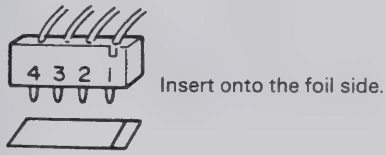
D1 ~ 4,5 (K, M), 6: IS1555

J31: W, T only

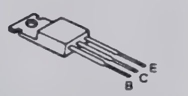
1. Installation of D7 (Use a jig.)



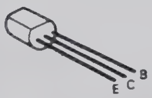
2. Installation of J28, J29 and J30



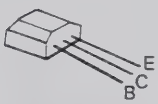
2SD880(Y)



2SA1015(Y)

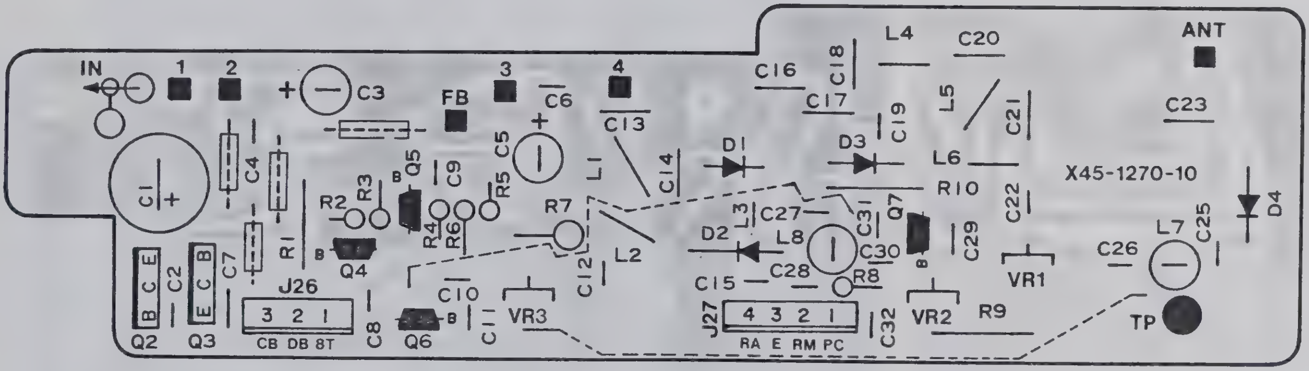


2SC2458(Y)



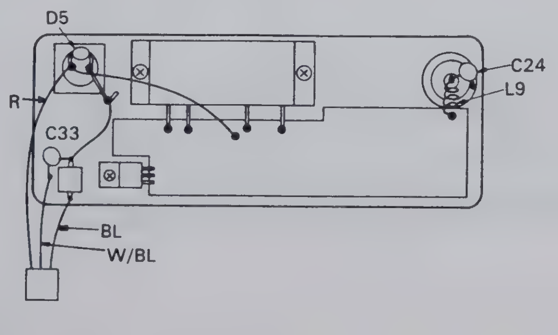
FINAL UNIT (X45 - 1270 - 10,11)

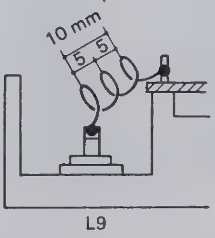
Component Side View

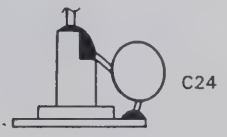


Q1: M57726(TR-7950), M57733(TR-7930)
Q2: 2SD880(Y), Q3: 2SA1015(Y)
Q4~7: 2SC2458(Y)
D1: UM9401 D2: MI402(TR-7950), MI303(TR-7930) D3,4: 1S1587
D5: U15B

1. Apply heat sinker to the power module and heat sink.
2. Tighten screw Q2, then others, to fix PCB.
3. Connect L9 and C24 as short as possible.
4. Expand the distance between coils L9 to about 5 mm.

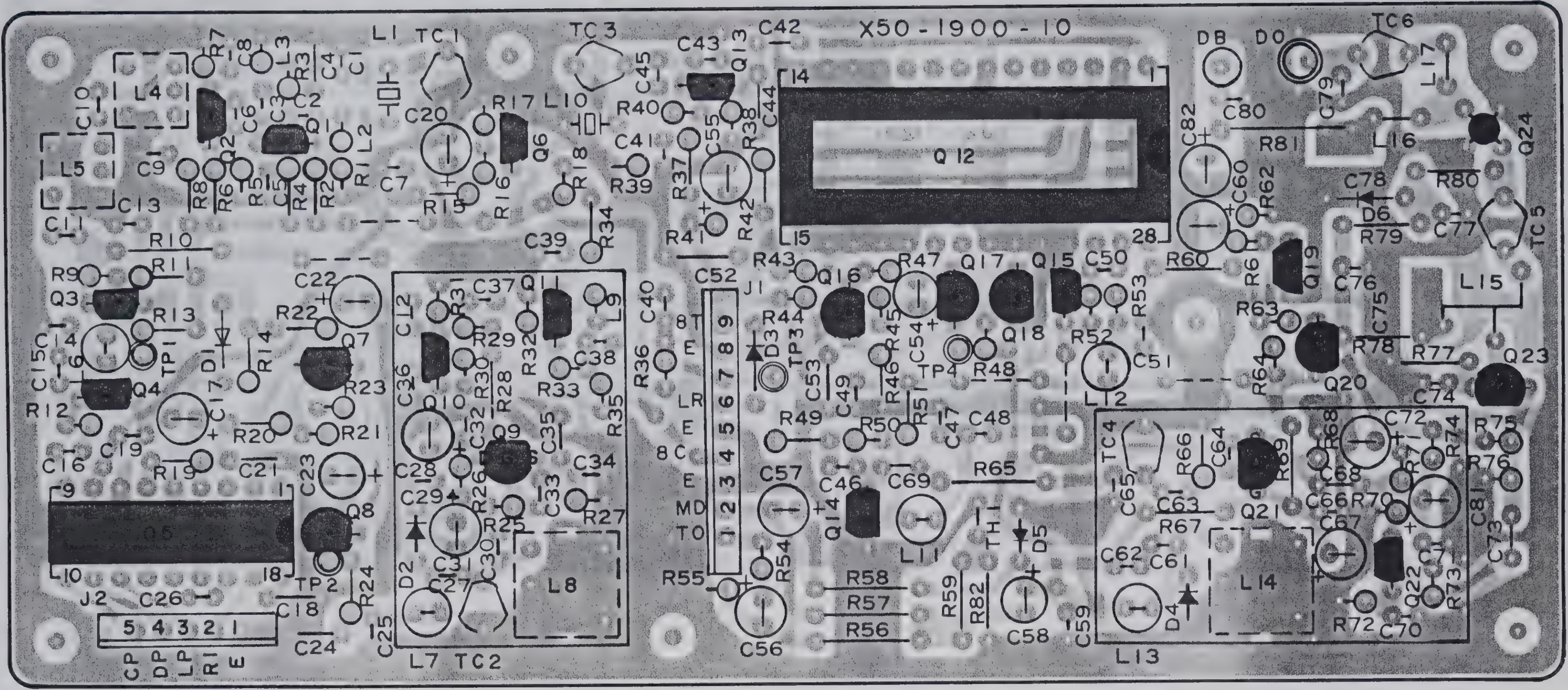






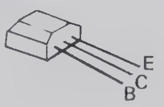
PC BOARD VIEW

PLL UNIT (X50-1900-10, 11) Component Side View

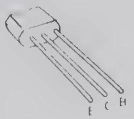


Q1,2,13: 2SC2787(L) Q3,4,10,11,14,15,22: 2SC2668(Y)
Q5: MC145155P Q6,19:2SC2603(D,E)
Q7,8: 2SC2240(GR) Q9:2SK125 Q12: MC145151P Q16～18: 2SC1775(E)
Q20: 2SA1015(Y) Q21:2SK125 Q22: 2SC2668(Y) Q23: 2SC2347
Q24: 2SC2538(TR-7930), 2SC3019(TR-7950)
D1: XZ-055 D2,5-1S2208 D3,6: 1S1555 D4: 1SV50

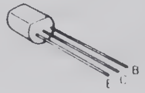
2SC2668



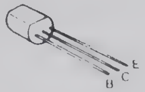
2SC2603
2SC2787



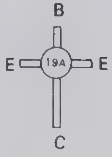
2SA1015
2SC1775
2SC2240
2SC2347



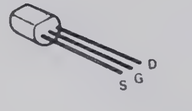
2SC2538-22-A



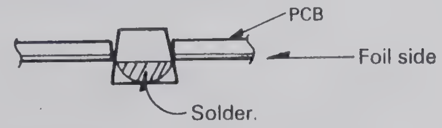
2SC3019



2SK125



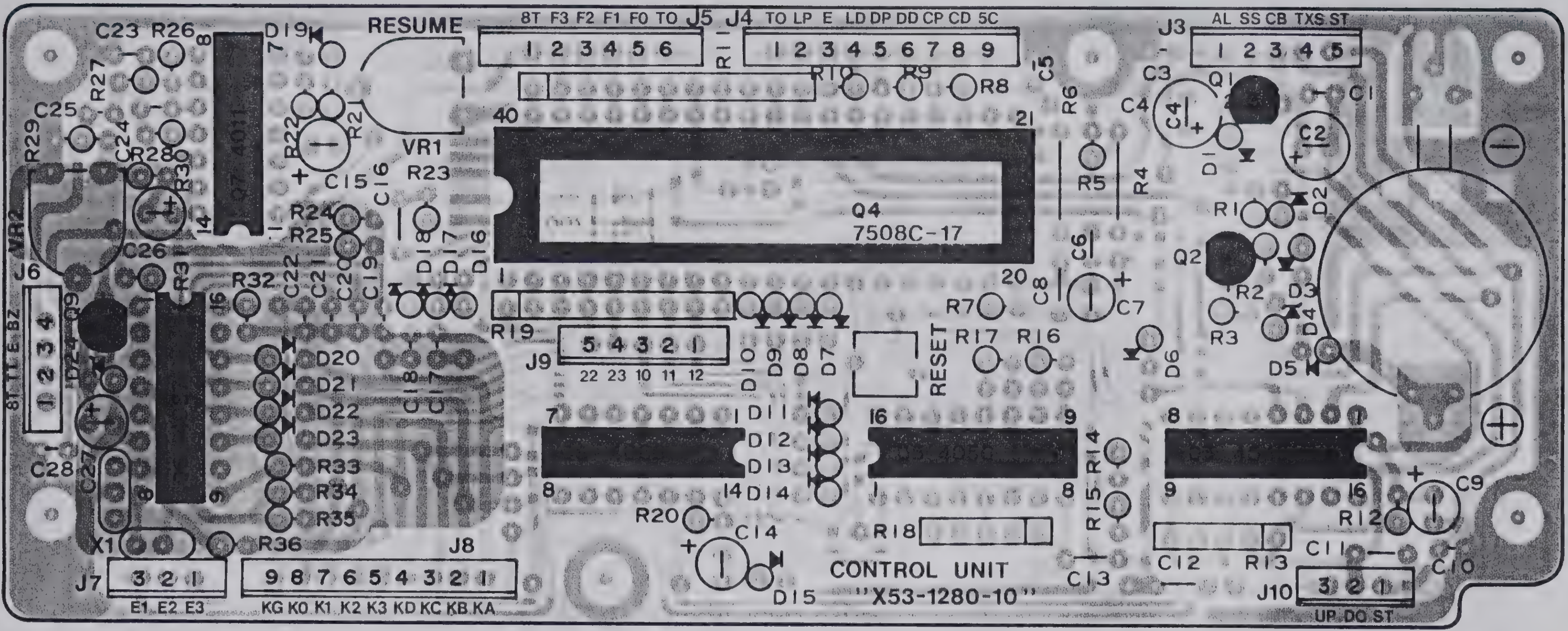
1. Installation of C75 and C78.



2. Incline C30 to L8,and L7 to shield case.

PC BOARD VIEW

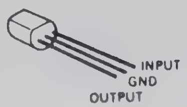
CONTROL UNIT (X53 - 1280 - 10,61) Component Side View


RESUME
J5
8T F3 F2 F1 F0 TO
1 2 3 4 5 6
J4
TO LP E LD DP DD CP CD 5C
1 2 3 4 5 6 7 8 9
J3
AL SS CB TXS ST
1 2 3 4 5
C23 R26 R27 C25 R29 C24 R28 R30 C26 R31 D19 Q7 4011 VR1 VR2 R21 R22 C15 C16 R23 R24 R25 R32 C22 C21 C20 C19 D18 D17 D16
J6
8T TT E BZ
1 2 3 4
Q9 D24 C27 C28 X1 R36
D20 D21 D22 D23 R33 R34 R35
J7
3 2 1
E1 E2 E3
J8
9 8 7 6 5 4 3 2 1
KG K0 K1 K2 K3 KD KC KB KA
40 21 1 20
Q4
7508C-17
R11 R10 R9 R8 C5 R6 R5 R4 C3 C4 Q1 C1 C2 D1 D2 R1 Q2 R2 D3 D4 D5 R3 D6 C6 C7 C8 R7 R17 R16
RESET
R19
J9
5 4 3 2 1
22 23 10 11 12
D10 D9 D8 D7 D11 D12 D13 D14
R14 R15 R18 R20 C14 D15
C9 R12 C10 C11 C12 R13 C13
J10
3 2 1
UP DO ST
CONTROL UNIT
"X53-1280-10"

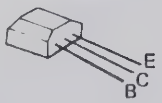
▨ :K,M only

Q1: NJM78L06K Q2:2SA1048(Y) Q3: TC4049BP Q4: μPD7508C-017
Q5: TC4050BP Q6:MC1466BCP Q7: TC4011BP Q8(K,M): LR4087
Q9(K,M)- 2SC2458
D1 ~ 3, 5 ~ 15, 16(W, T), 17(W, T), 19, 20 ~ 23(K, M): IS1555

NJM78L06K

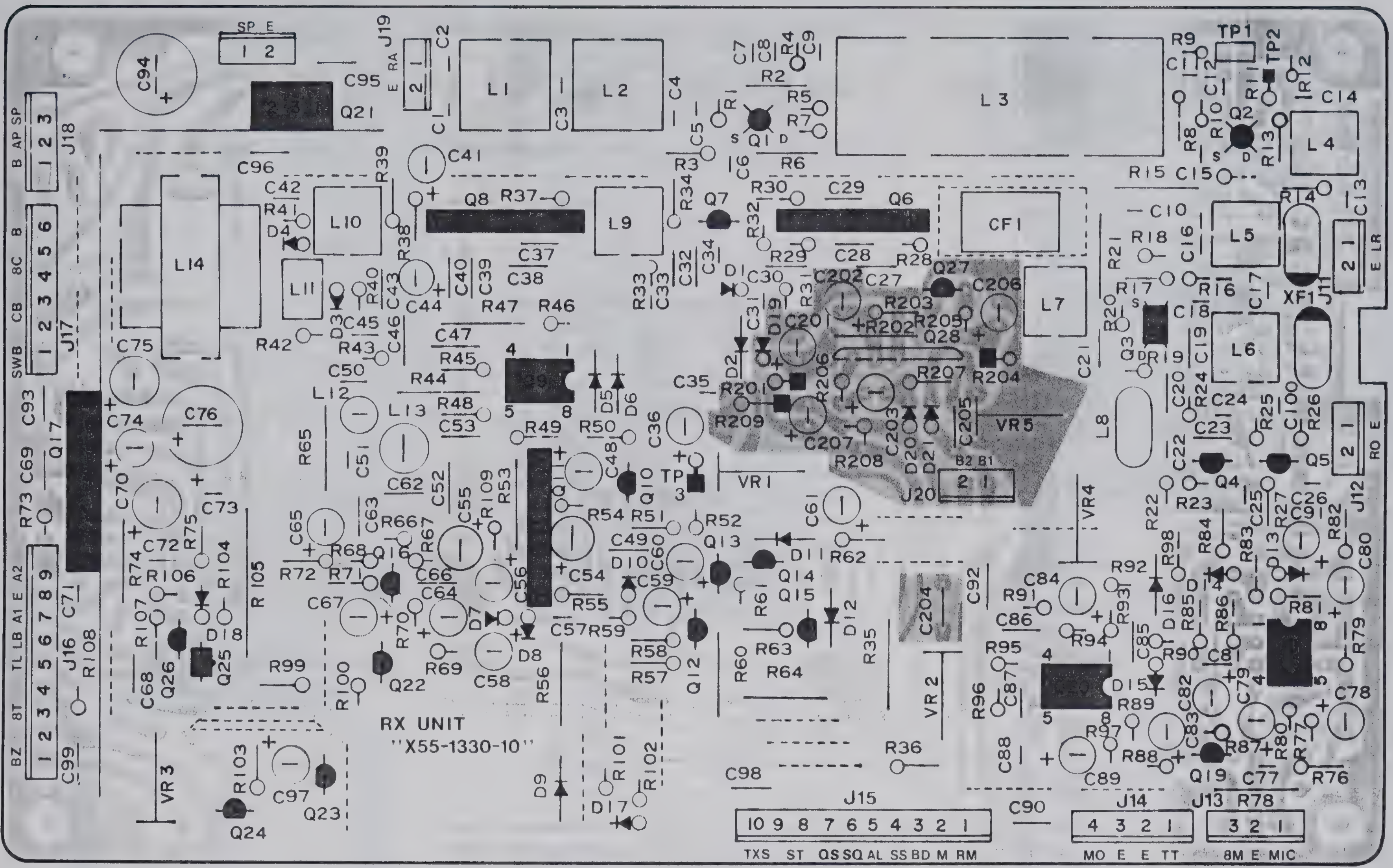


2SA1048
2SC2458



PC BOARD VIEW

RX UNIT (X55 - 1330 - 10,61,51) Component Side View



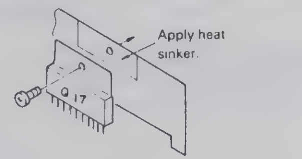
D21
C206,207 } T only
R208,209

Q1,2: 3SK74(L) Q3:3SK73(GR) Q4,5,7: 2SC2787(L)
Q6: TA7302P Q8:µPC577H Q9,18,20:µPC4558C
Q10, 15, 23, 26, 27(W, T): 2SC2458(Y) Q11: µPC592H2 Q12 ~ 14: 2SC2458(BL)

Q16- 2SC2240(GR) Q17: MB3712 Q21: µPC78M08H Q22,24: 2SC1959(Y)
Q25: 2SC496(Y) Q28(W,T): AFG05F1750A2
D1,2,5~17,20(W,T), 21(T): 1S1555 D3,4: IN60 D18:WZ-120 D19: XZ-060(W, T)

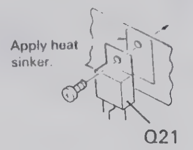
▨ :W,T only

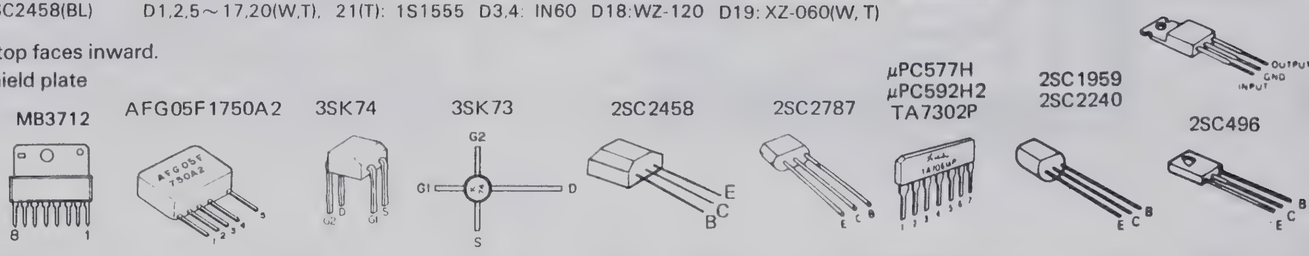
1. Installation of Q17 to shield plate.



2. Install XF1s so that the top faces inward.

3. Installation of Q21 to shield plate

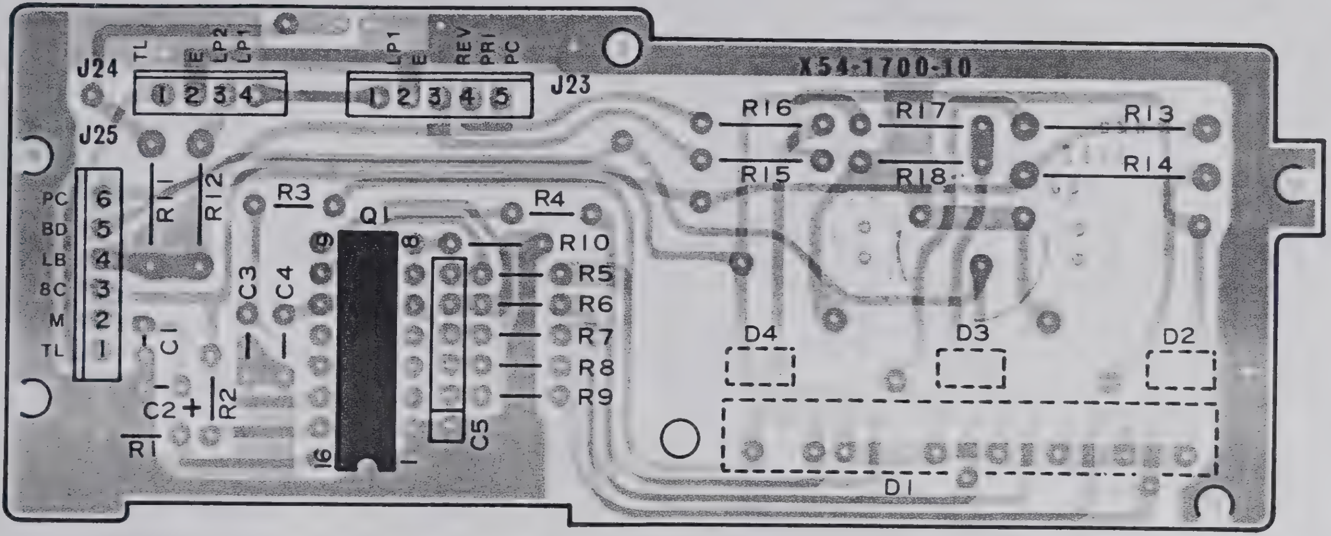




A B C D E F

DISPLAY ASSY UNIT (X60-1230-10) PC BOARD VIEWS

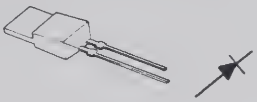
DISPLAY UNIT (X54 - 1700 - 10) Component Side View



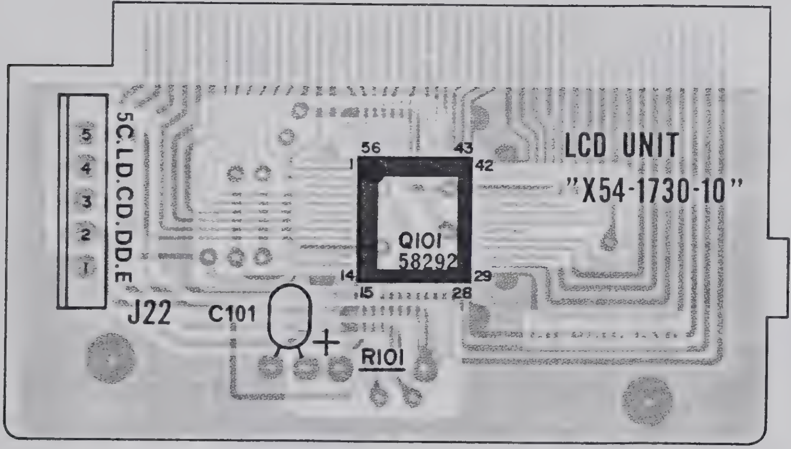
Q1: TA7612AP
D1: GL107S12 D2, 4: GL9HY24 D3: PY5532K

Attach D1, D2, D3 and D4 to the foil side and solder them using a jig.

GL9HY24

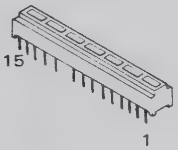


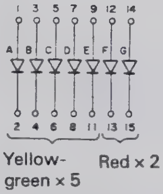
LCD UNIT (X54 - 1730 - 10) Component Side View



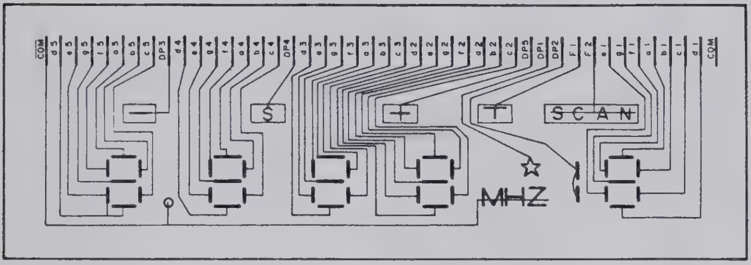
Q101 : MSM58292GS

GL107S12

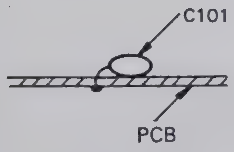




No.	FUNCTION
1	Dot A Anode
2	Dot A Cathode
3	Dot B Anode
4	Dot B Cathode
5	Dot C Anode
6	Dot C Cathode
7	Dot D Anode
8	Dot D Cathode
9	Dot E Anode
10	NO PIN
11	Dot E Cathode
12	Dot F Anode
13	Dot F Cathode
14	Dot G Anode
15	Dot G Cathode



1. Install C101 as shown below.



2. Install Q101 with mark aligned.

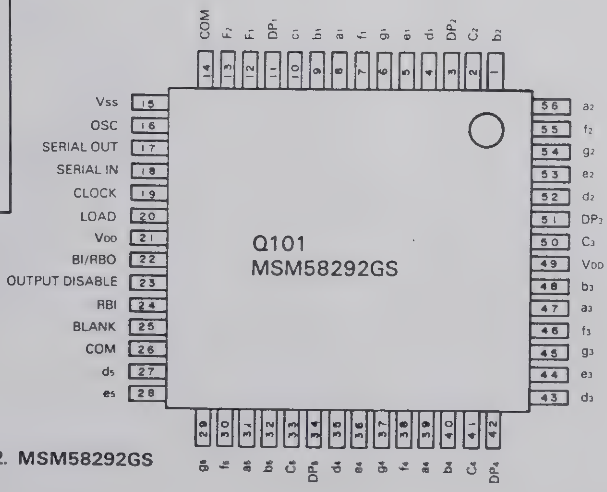


Fig. 12. MSM58292GS

DISASSEMBLY

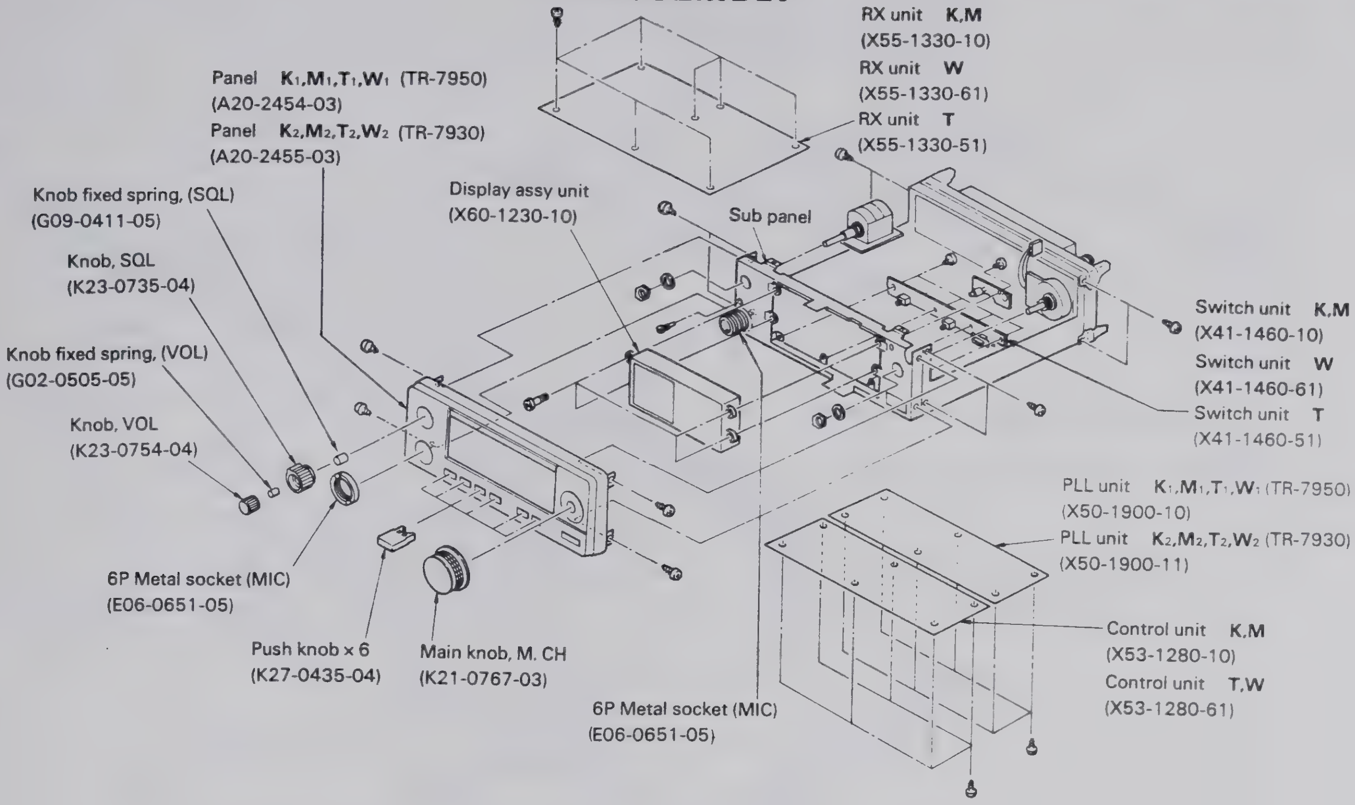


Fig 13. Front panel

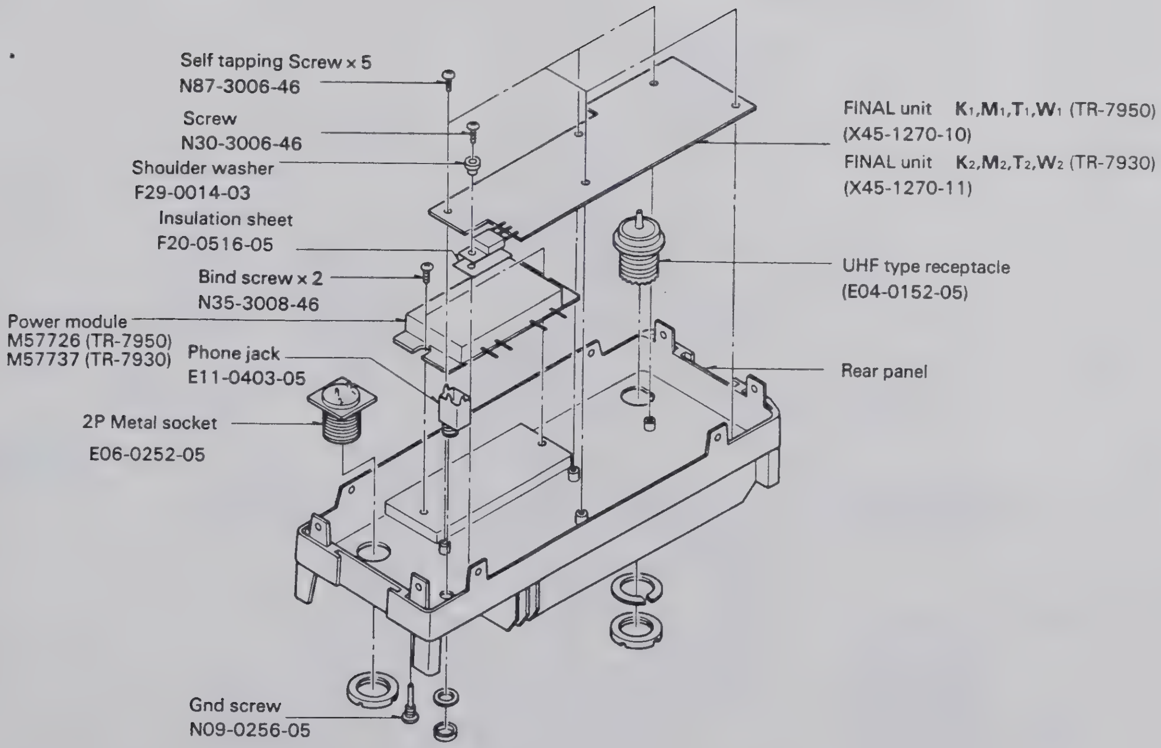


Fig 14. Rear panel

DISASSEMBLY

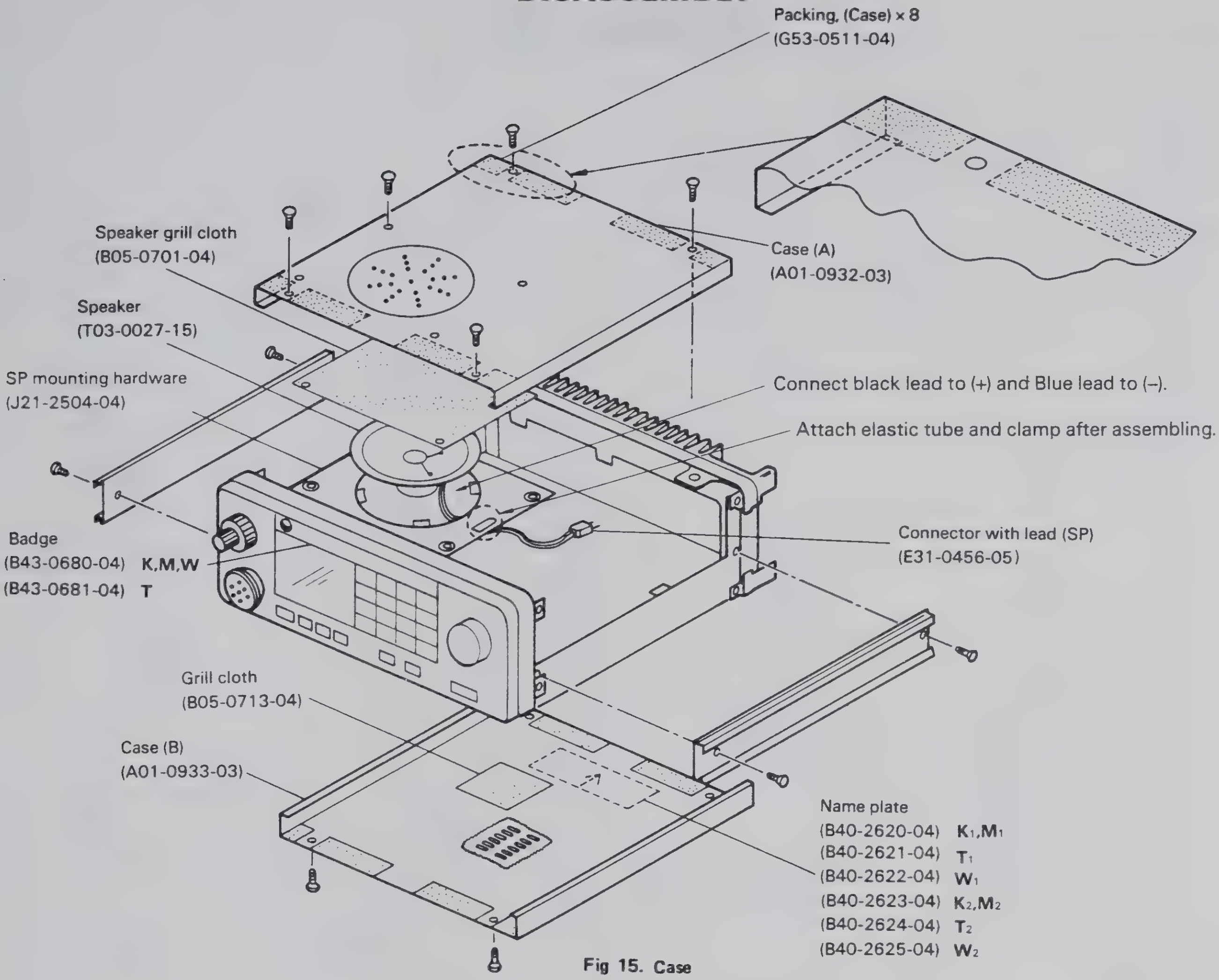


Fig 15. Case

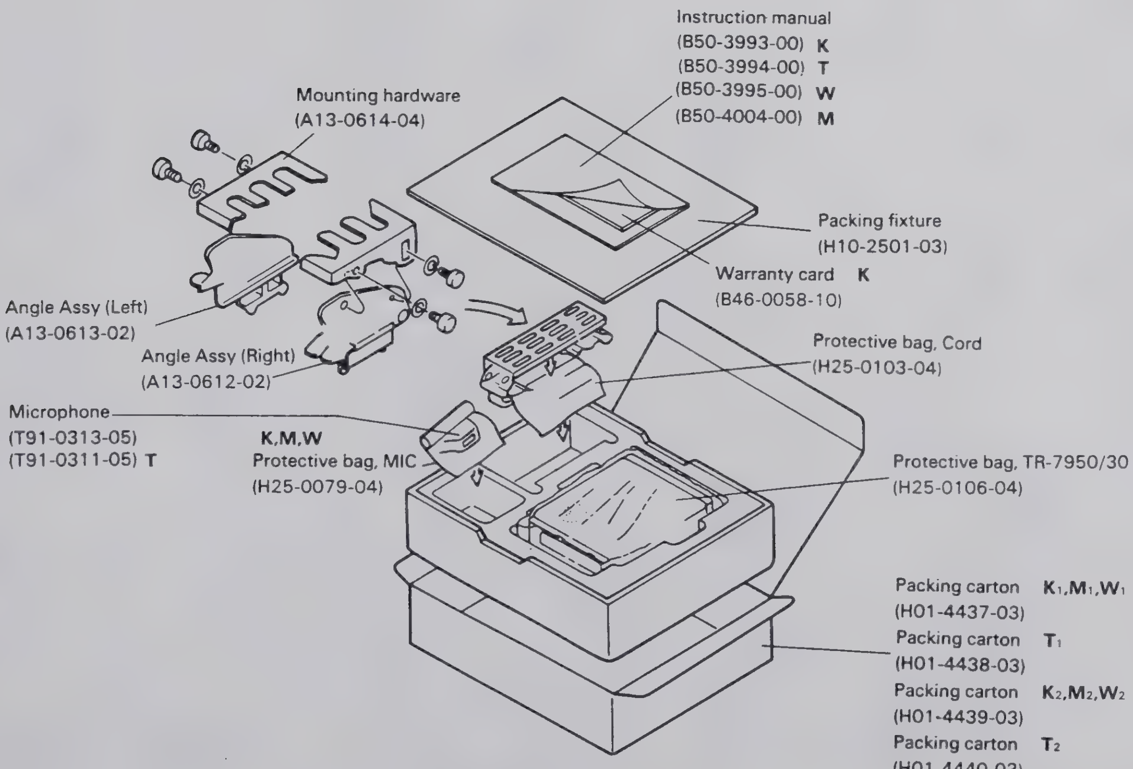
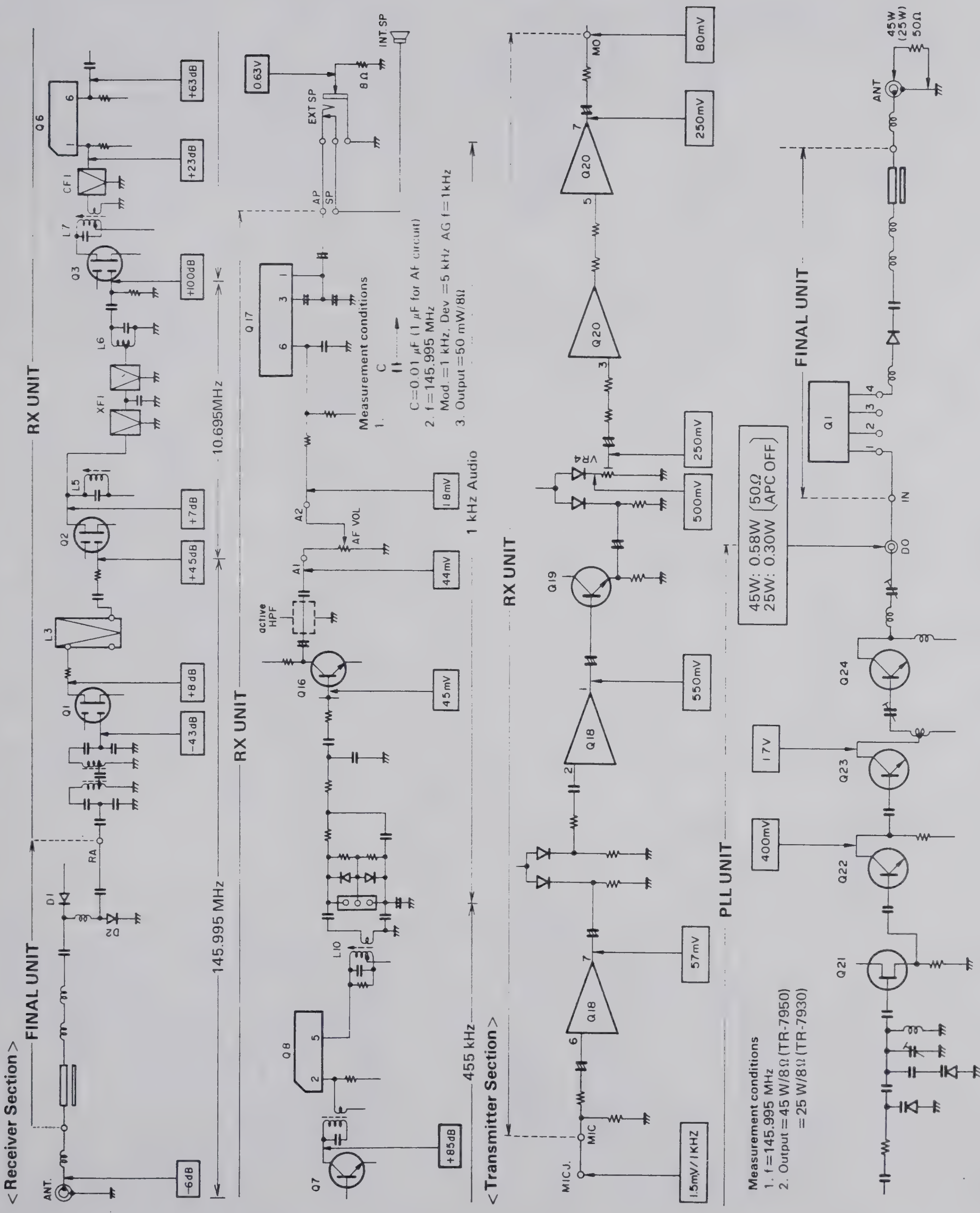


Fig 16. Packing

LEVEL DIAGRAM



45W: 0.58W (50Ω APC OFF)
25W: 0.30W

Measurement conditions
1. C ⊣⊢ C=0.01 μF (1 μF for AF circuit)
2. f=145.995 MHz
Mod.=1 kHz, Dev.=5 kHz AG f=1kHz
3. Output=50 mW/8Ω

Measurement conditions
1. f=145.995 MHz
2. Output=45 W/8Ω (TR-7950)
=25 W/8Ω (TR-7930)

ADJUSTMENTS

<Test Equipment>

1. Tester
   - Input Sufficient
2. RF VTVM (RF V.M.)
   - Input impedance 1 MΩ and less than 2 pF
   - Voltage range F.S. = 10 mV to 300V
   - Frequency range 150 MHz or greater
3. Frequency counter (F count)
   - Minimum input voltage 50 mV
   - Frequency range 150 MHz or greater
4. DC power supply
   - Voltage 10V to 17V variable
   - Current 8A min
5. RF Power Meter
   - Dissipation 50W
   - Impedance 50Ω
   - Frequency range 144 MHz
6. AF VTVM (AF V.M.)
   - Input impedance 1 MΩ or greater
   - Voltage range F.S. = 1 mV to 30V
   - Frequency range 50 Hz to 10 kHz
7. AF Generator (AG)
   - Frequency range 100 Hz to 10 kHz
   - Output 0.5 mV to 1V
8. Linear detector
   - Frequency range 144 MHz
9. Directional coupler
10. Oscilloscope
    - With horizontal input and high sensitivity
11. Standard signal generator (SSG)
    - Frequency range 144 ~ 149 MHz
    - Modulation amplitude and frequency modulation
    - Output −20 dB ~ 100 dB
12. AF Dummy load
    - 8Ω, 5W (approx.)
13. Sweep generator
    - Frequency range 144 ~ 149 MHz

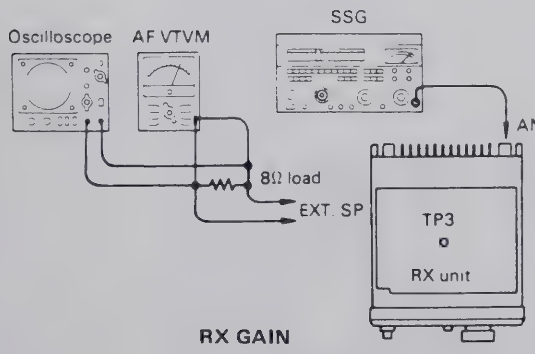


Fig 18.

<Preparation>

Unless otherwise specified, set the controls as follows

POWER/ VOL SW	ON
SEND/ REC (MIC)	REC
AF VOL	MIN
SQUELCH VOL	MIN
SELECT	KEY
SCAN	TO
HI/ LOW SW	HI
PRIORITY	
ALERT	OFF
OPER	OFF
TONE	OFF
REV	OFF

Notes:

- When adjusting the trimmers or coils, use a non-induced adjusting rod of bakelite, etc.
- When adjusting the RX section never transmit to prevent SSG damage.
- Connect MIC connector as shown in Fig. 17.

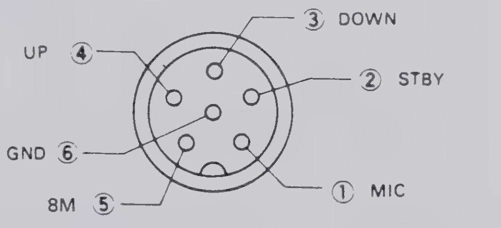


Fig 17. MIC terminals (view from font panel side)

- The output level of SSG is indicated as SSG's open circut

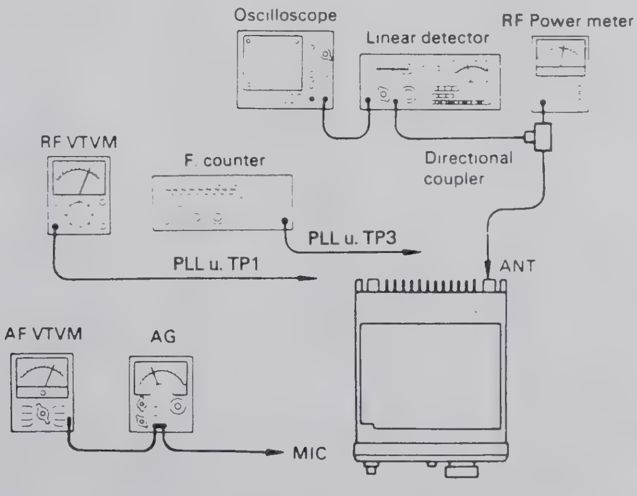
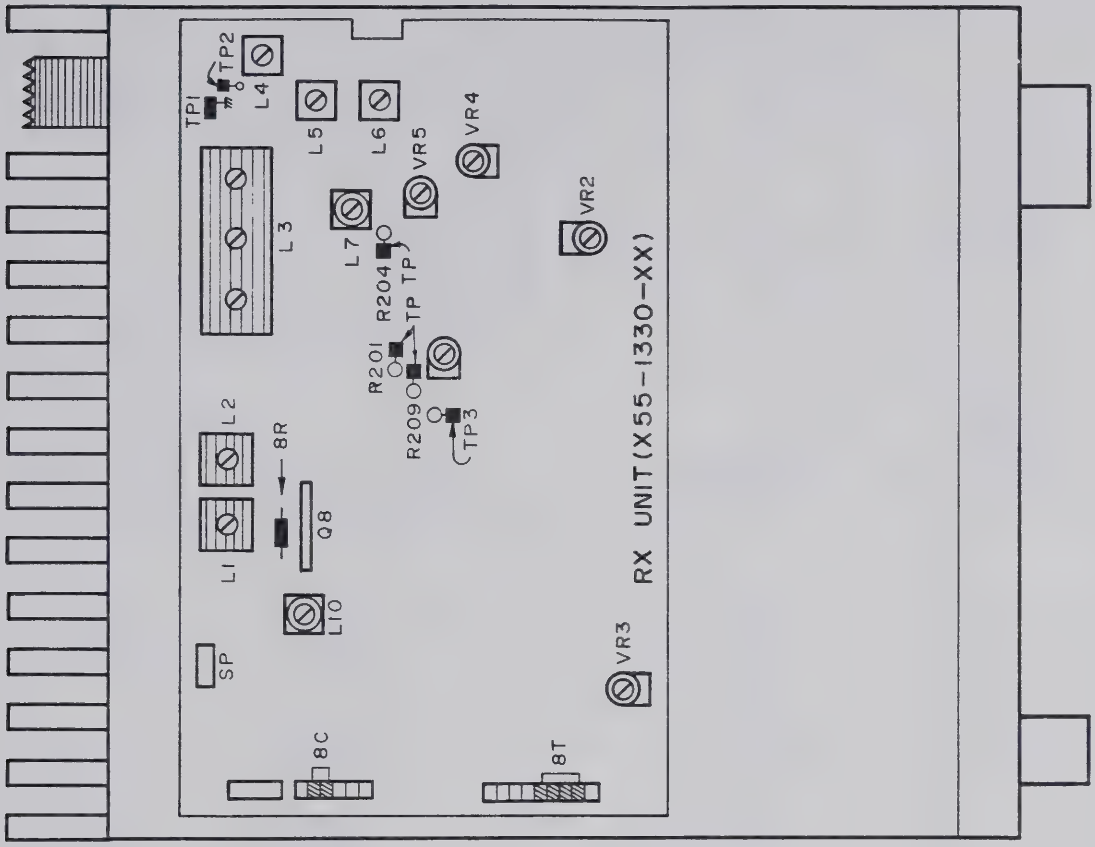


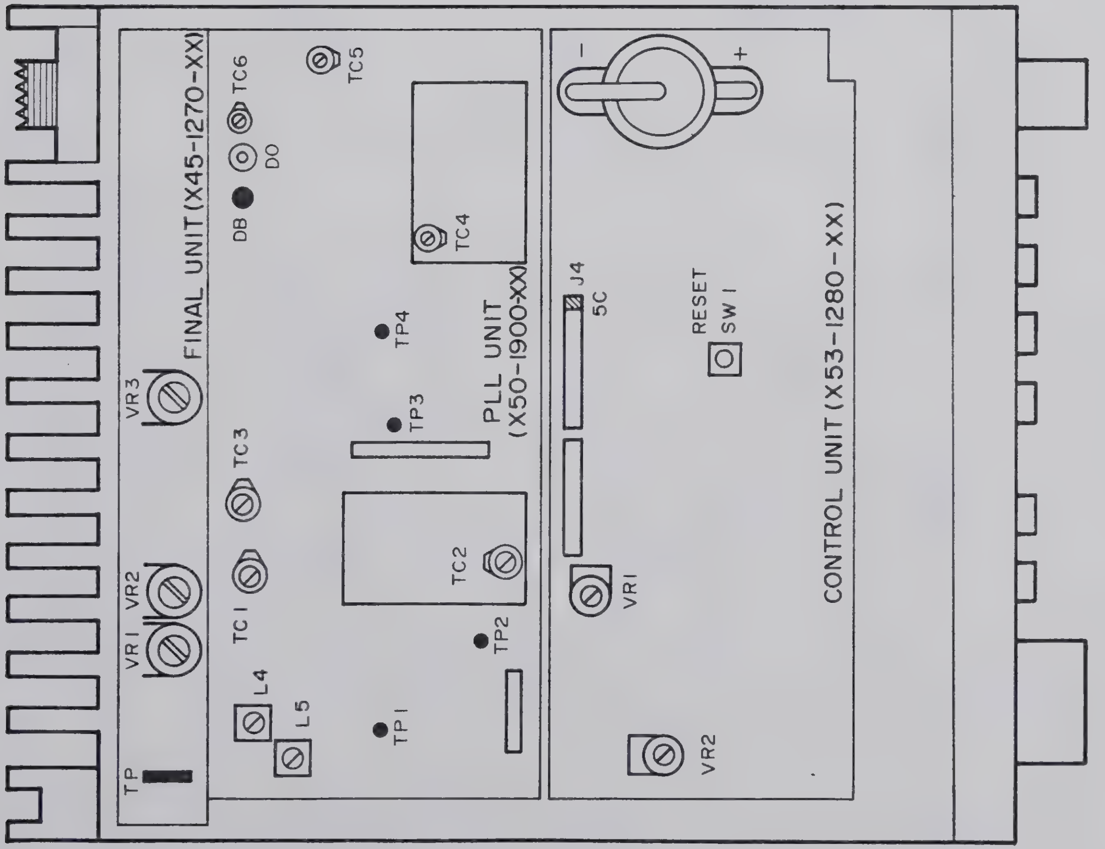
Fig 19. PLLU, DRIVE, Deviation

ADJUSTMENT POINT

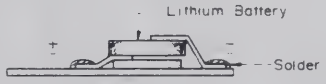
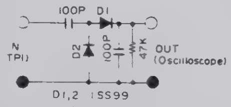
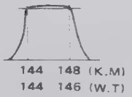
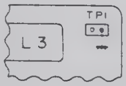
TOP VIEW



BOTTOM VIEW



ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Voltage check	1) DC power supply: 13.8V Power SW: ON SQL control: MIN. (fully CCW)	DVM (Digital volt meter)	RX	8R				7.6 ~ 8.2V
				8C				7.7 ~ 8.3V
				8T				0.3V or less
	2) Transmit			8T				7.6 ~ 8.2V
				8R				0.1V or less
			PLL	DB				7 ~ 13V
	3) Receive		CON-TROL	5C				5.1 ~ 5.7V
2. Reset	1) Depress (CONTROL unit) SW1. RESET SW ON, 2 ~ 3 times.	Display						4,000
	2) SELECT: M. CH MEMORY: b							7,995 (K, M) 5,995 (W, T)
3. Lithium Backup Battery	1) Solder the Lithium Battery to the CONTROL unit when Power SW is ON.	DVM	CON-TROL					Do not short the Lithium Battery. 3V
4. "Beeper"	1) VOL: 12 : 00 SQL: 12 : 00 MIC: Connect and press the MIC UP or DOWN continuously.	AF VTVM	Rear -Panel	SP	RX	VR3	0.5V	
5. PLL	1) Dial: 8.995 5.995 (W,T)	RF VTVM	PLL	TP1	PLL	L4, 5	MAX.	1.0V or more
	2) Dial: 2.000 4.000 (W,T)	DC, VM		TP2		TC2	6.2V 5.2V (W, T)	±0.1V
	3) Transmit			TP4		TC4	2.5V 3.5V (W, T)	±0.1V
	4) Receive Dial: 5.000	f.counter		TP3		TC1	134.305 MHz	±100 Hz
	5) Transmit			DO		TC3	145.000 MHz	
6. DRIVE	1) Dial: 6.600 5:995 (W, T) Transmit	Power -meter		DO		TC5, 6	MAX.	0.5W or more 0.2W or more (K2, W2, T2, M2)
7. HELICAL	1) ANT: Sweep Gen. Output 10dB	Detector Oscillo-scope	RX	TP1  100P D1 N TP1) D2 100P 47K OUT (Oscilloscope) D1,2 1SS99	RX	L1, 2, 3	Adjust to obtain the waveform shown. 	
8. GAIN	1) Dial: 6.000 5.000 (W, T) ANT: SSG Output 10 dBμ Mod. 1 kHz, DEV/5 kHz f: 146 MHz 145 MHz (W, T)	DC VTVM	RX	TP3	RX	L4, 5 6, 7		0.8V or more
9. S-meter	1) Dial: 6.000 5.000 (W, T) ANT: SSG Output 15 dBμ Mod. 1 kHz, DEV/5 kHz	S-LED S-meter	Front-panel		RX	VR1	All LED's ON.	
		C.TUNING LED					LED should light.	
10. Discriminator	1) ANT: SSG Output 60 dBμ Mod. 1 kHz, DEV/5 kHz	AF VTVM Oscillo-scope	Rear -Panel	SP	RX	L10	MAX.	
S/N	2) SSG Output: −6 dBμ						Check	S/N 20 dB or more
11. POWER	1) Final unit VR2, 3: MAX. (fully CW) 2) Dial: 6.600 5.000 (W, T) Connect coax. cable to DO terminal in the PLL unit. Then transmit.	Ammeter in the DC supply			PLL	TC6	MAX.	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
12. PROTECTION null		DC Multi meter	FINAL	TP	FINAL	VR1	MIN.	0.5V or less
		Power -meter	Real -Panel	ANT				45W or more (TR-7950) 30W or more (TR-7930)
13. RF. LED						VR2	25W (TR-7950) 15W (TR-7930)	
		RF-LED	Front-Panel		RX	VR2	All RF-LED's should light.	
14. POWER SET-1 (TR-7950 only)	1) Final unit VR2: MAX. (CW) Increase the DC supply voltage untill output becomes 55W. Dial: 8.995 5.995 (W1, T1)	Power -meter	Rear -Panel	ANT	FINAL	VR2	52W	
	2) Reset voltage to 13.8V						Check	4.5W or more (144 ~ 148MHz)
15. POWER SET-2 (TR-7930 only)	1) Dial: 8.995 5.995 (W_2, T_2)				FINAL	VR2	28W	
16. LOW POWER	1) HI/LOW SW: LOW	Power -meter		ANT			Check	3 ~ 9W (TR-7950) 2 ~ 6W (TR-7930)
		RF-LED						2 ~ 4 LED's should light.
17. PROTCTION Current	1) ANT: Open	DC Power Supply Ammeter			FINAL	VR3	4A (TR-7950) 2.5A (TR-7930)	
18. DEV	1) MIC 30 mV/1 kHz 2) MIC 3 mV/1 kHz	Linear -Detector			RX	VR4	4.6 kHz	± 100 Hz
19. SCAN	1) SCAN SW: TO Confirm (CONTROL unit) VR1 at 12 o'clock. SQL CONTROL: MIN (CCW) KEY Board: Press "SC"						Check	Should be SCAN 3 ~ 7 seconds
	2) KEY Board: Press "C"							
20. TONE (W1, W2 only)	1) Same as item 18. TONE SW: ON	f counter			RX	VR5	1,750 Hz	± 10 Hz
		Linear Detector					Check	2.5 kHz or more
21. TONE Buarst (T1, T2 only)	1) Same as item 18. Connect a short jumper to R204, R201, R209 in the RX unit. Transmit	f counter			RX	VR5	1,750 Hz	± 10 Hz
		Linear -Detector					Check	2.5 kHz or more
	2) Disconnect short jumper Transmit TONE SW: ON	Monitor					Check	Should be monitored 0.5 ~ 1 second.
22. Touch TONE (K1, K2, M1, M2 only)	1) Transmit KEY Board: Press "S"	Linear -Detector			CONTROL	VR2	3 kHz	± 1 kHz

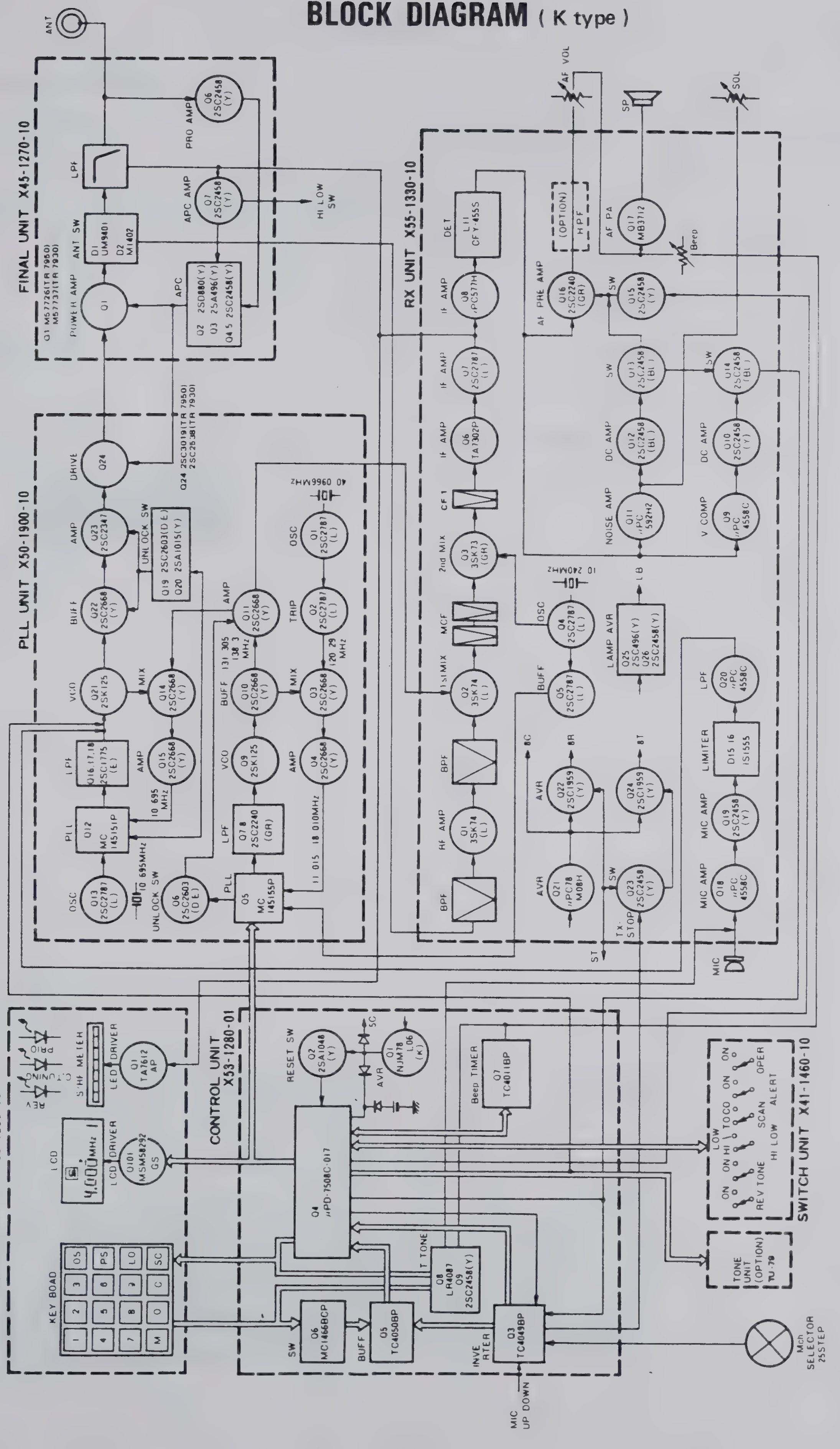
<Micro-processor operational check>

Item	Condition	Operation check
1. KEY BOARD	1) SELECT SW: KEY SQL control: MIN (CCW) POWER SW: ON RESET SW: ON	🅂 4.000 1
	2) KEY 1, 9, 0, PS, LO 1, 2, 3, 6, 7, 8, 9, 0, PS, LO (W, T)	🅂 4.000 1
	3) KEY 2, 2, 2, 2, 2, 2, 2, 2, (W, T)	🅂 2.220 1 Tone sounds 4 times. 🅂 4.220 1 (W, T)
	4) KEY 3, 3, 3, 3, 4, 3, 3, 3, (W, T)	🅂 3.330 1 Tone sounds 4 times. 🅂 4.330 1 (W, T)
	5) KEY 4, 4, 4, 4,	🅂 4.440 1 Tone sounds 4 times.
	6) KEY 5, 5, 5, 5,	🅂 5.555 1 Tone sounds 4 times.
	7) KEY 6, 6, 6, 6, 5, 6, 6, 6, (W, T)	⊟ 6.665 1 Tone sounds 4 times. ⊟ 5.665 1 (W, T)
	8) KEY 7, 7, 7, 7, 5, 7, 7, 7, (W, T)	⊟ 7.775 1 Tone sounds 4 times. ⊟ 5.775 1 (W, T)
	9) KEY 8, 8, 8, 8, 5, 8, 8, 8, (W, T)	🅂 8.885 1 Tone sounds 4 times. 🅂 5.885 1 (W, T)
	10) KEY 8, 9, 9, 9, 5, 9, 9, 9, (W, T)	🅂 8.995 1 Tone sounds 4 times. 🅂 5.995 1 (W, T)
	11) KEY 5, 0, 0, 0	🅂 5.000 1 Tone sounds 4 times.
	12) KEY OS	⊞ 5.000 1 The tone sounds.
	13) MEMORY Turn the dial to the right 1 step.	⊞ 5,000 2
	14) KEY M	⊞ 5.000 2 The tone sounds.
	15) Turn MEMORY Dial to the right. 2, 3, 4 ... 19, A, b, 1, 2	LCD MEMORY CH number should indicate. The tone sounds. b → 1 (or 1 → b)
2. SELECT SW	1) SELECT SW: M. CH	⊞ 5.000 2
	2) Turn MEMORY Dial left 1 step.	🅂 4.000 1 The tone sounds.
	3) KEY LO	🅂 4.000 ★ 1 The tone sounds.
3. REV & PRIO SW's	1) SELECT SW: KEY	⊞ 5.000 1
	2) REV SW: ON.	5.600 1
	3) REV SW: OFF OPER SW: ON	🅂 4.000 ★ 1 REV-LED should extinguish. PRIO-LED should light.
4. ALERT	1) OPER SW: OFF SQL control: MIN (CCW) ALERT SW: ON VOL control: 9:00 ~ 10:00	PRIO-LED goes off. Noise should momentarily mute approx. 0.3 second, every 6 ~ 7 seconds.
5. PS KEY	1) Turn MEMORY Dial to CH b. KEY PS: ON	⊞ 5.000 b The tone sounds.
	2) ALERT SW: OFF OPER SW: ON	🅂 7.995 b 5.995 b (W, T)
6. SCAN SW	1) OPER SW: OFF KEY "SC": ON	PRIO-LED goes off. 6 SCAN 4.000 b The tone sounds. The display should step up in 5 kHz steps approx every 6 seconds.
	2) KEY "C": ON	

< REFERENCE >

Japanese "SG"	American "SG"
−6 dB	0.25 μV
0 dB	0.5 μV
6 dB	1 μV
12 dB	2 μV
24 dB	8 μV
30 dB	15.8 μV
40 dB	50 μV
50 dB	158 μV
60 dB	500 μV
70 dB	1.58 mV
80 dB	5 mV
90 dB	15.8 mV
100 dB	50 mV
120 dB	0.5V

BLOCK DIAGRAM (K type)



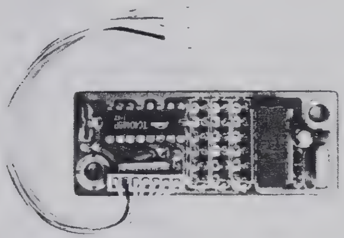
TU-79

TU-79 TONE UNIT (K. M only)

TU-79 SPECIFICATIONS

Oscillator frequency .... 1 MHz ± 0.1%
Output frequency........ 37 band within 67.0 Hz ~ 250.3 Hz

NOTE: To Control Unit J5



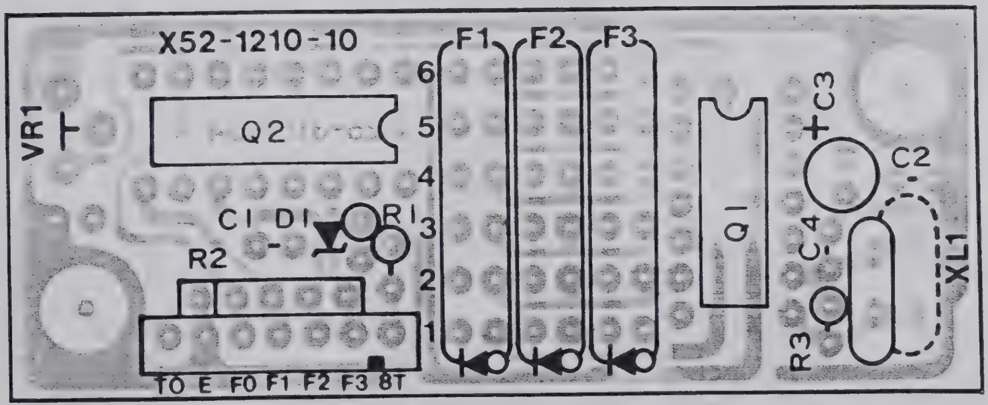
TU-79 PARTS LIST

N : New Parts

Part No.	Re-marks	Description	Ref. No.
GENERAL			
B50-4020-00	N	Instruction manual	
H01-4459-03	N	Packing carton	
H25-0029-04		Protective bag	
N87-3012-46		Self tapping screw × 2	
X52-1210-10	N	Tone unit	
TONE unit (X52-1210-10)			
CC45CH1H220J		C, 22P	C4
CE04W1A470M		E, 47	C3
C91-0131-05		C, 0.01	C1,2
E02-0110-05	N	IC socket 14P	
E31-2160-05	N	Connector with lead	
J31-0502-04		PC board collar	
J42-0404-05		PC board bush	
L77-0983-05		Crystal 1 MHz	XL1
MX315		IC	Q1
TC4049BP		IC	Q2
XZ-055		Zener Diode	D1
1S1555		Diode	D11 ~ 16 21 ~ 26 31 ~ 36
R12-1419-05		Trim. Pot. 3 kΩ	VR1
R90-0124-05		Resistor block 47 kΩ × 4	R2

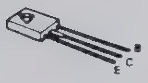
TU-79 PC BOARD (X52 - 1210 - 10)

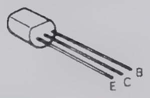
Component side view

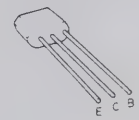


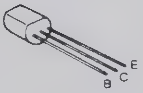
ABBREVIATION

AL	Alert
AP	Audio Power Output
A1	Top of AF Control
A2	Arm of AF Control
B	+13.8V
BD	Busy Light
BZ	Buzzer
B1	Tone Unit Switched +B W.T only
B2	Tone Unit +B W. T only
CB	Common +B
CD	LCD IC Data
CP	PLL IC Data
DB	Drive +B
DD	LCD IC Data
DO	MIC Down Switch
DP	PLL IC Data
E	GND
E1	Rotary Encoder
E2	Rotary Encoder
E3	Rotary Encoder
F0 ~ F3	Tone Select Code
KA	Key Board "Row"
KB	Key Board "Row"
KC	Key Board "Row"
KD	Key Board "Row"
KG	Key Board GND
K1	Key Board "Column"
K2	Key Board "Column"
K3	Key Board "Column"
K4	Key Board "Column"
LB	Lamp +B
LD	LCD IC Data
LP	PLL IC Data
LP1	Rotary Lamp 1
LP2	Rotary Lamp 2
LR	RX Local
M	Meter
MO	Modulator Out
PC	Power Control
PR1	Priority Light
QS	Squelch Switch
RA	RX Antenna
REV	Reverse Light
RI	Reference Oscillator Input
RM	RF Meter
RO	Reference Oscillator Output
SP	Speaker
SQ	Squelch Control
SS	SCAN Stop
ST	Stand by Switch
SWB	Switched +B
TL	TX Light
TO	Tone Output
TT	Touch Tone Signal
TXS	TX Stop
UP	MIC Up Switch
5C	+5V Common
8C	+8V Common
8T	+8V in TX
10	μ-proc. port-1
11	μ-proc. port-1
12	μ-proc. port-1
22	μ-proc. port-2
23	μ-proc. port-2


2SA496
2SC496


2SA1015(Y)
2SC945(Q)
2SC1675(L)
2SC1775(E)
2SC1815(Y, BL)
2SC1959(Y)
2SC2240(GR)


2SC2603(D, E)
2SC2787(L)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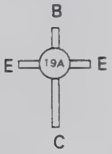
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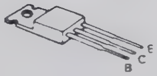
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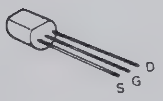
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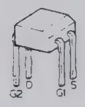
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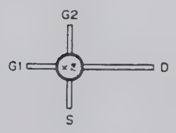
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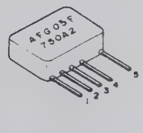
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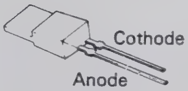
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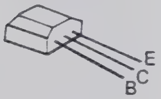
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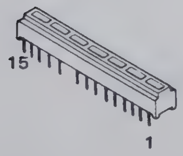
2SC2458(Y,BL)
2SC2668(Y)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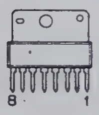
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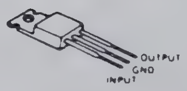
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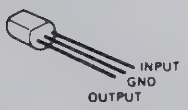
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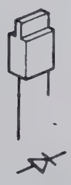
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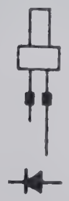
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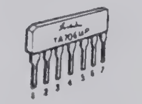
TA7302P
μPC577H
μPC592H2

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1111 West Walnut Street, Compton, California 90220,U.S.A.
TRIO-KENWOOD COMMUNICATIONS
DIVISION OF TRIO-KENWOOD ELECTRONICS GmbH
Rembrücker Str. 15, 6056 Heusenstamm, West Germany
TRIO-KENWOOD ELECTRONICS, N.V.
Leuvensesteenweg 504, B-1930 Zaventem Belgium
TRIO-KENWOOD (AUSTRALIA) PTY. LTD. (INCORPORATED IN N.S.W.)
4E Woodcock Place, Lane Cove, N.S.W. 2066, Australia

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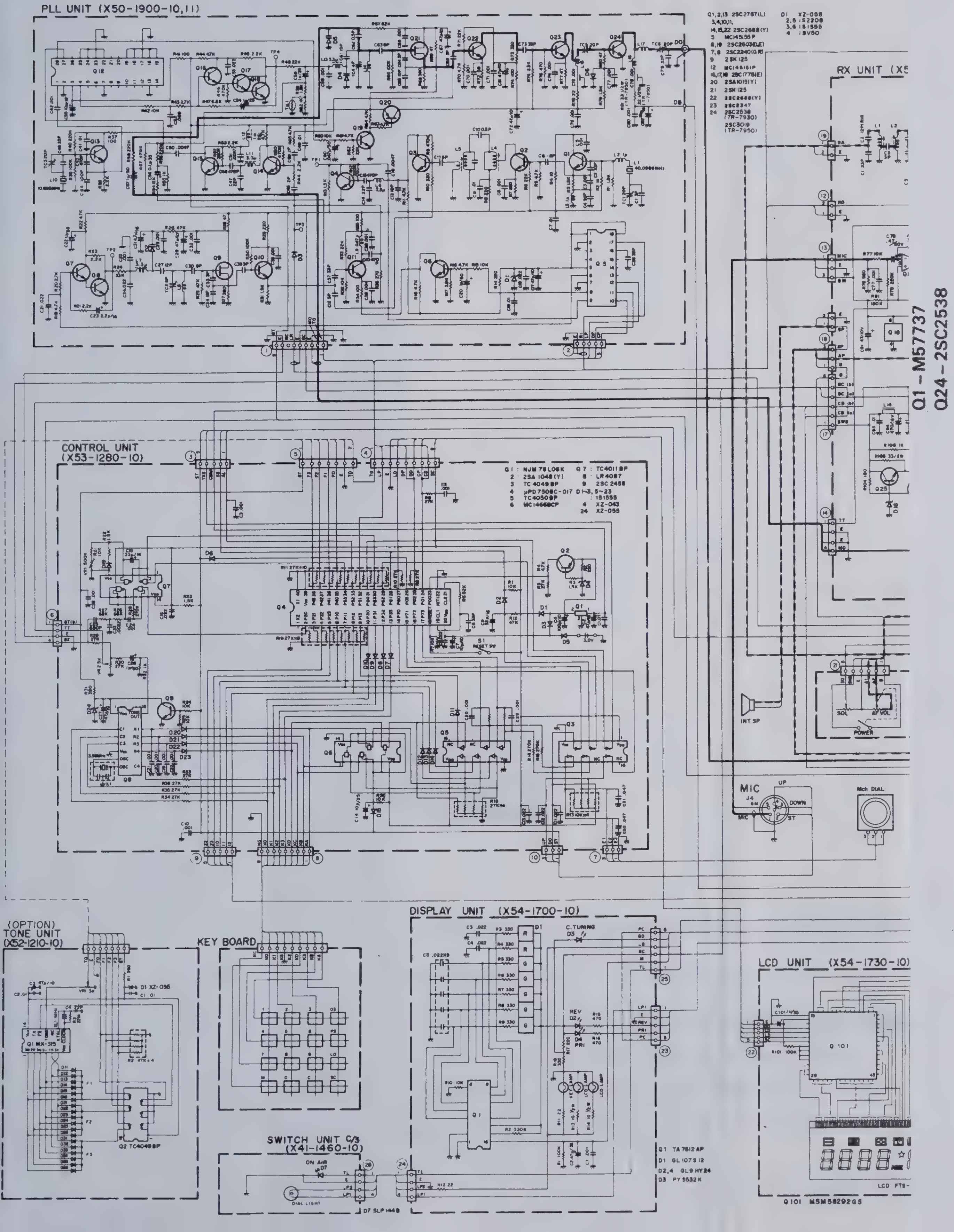
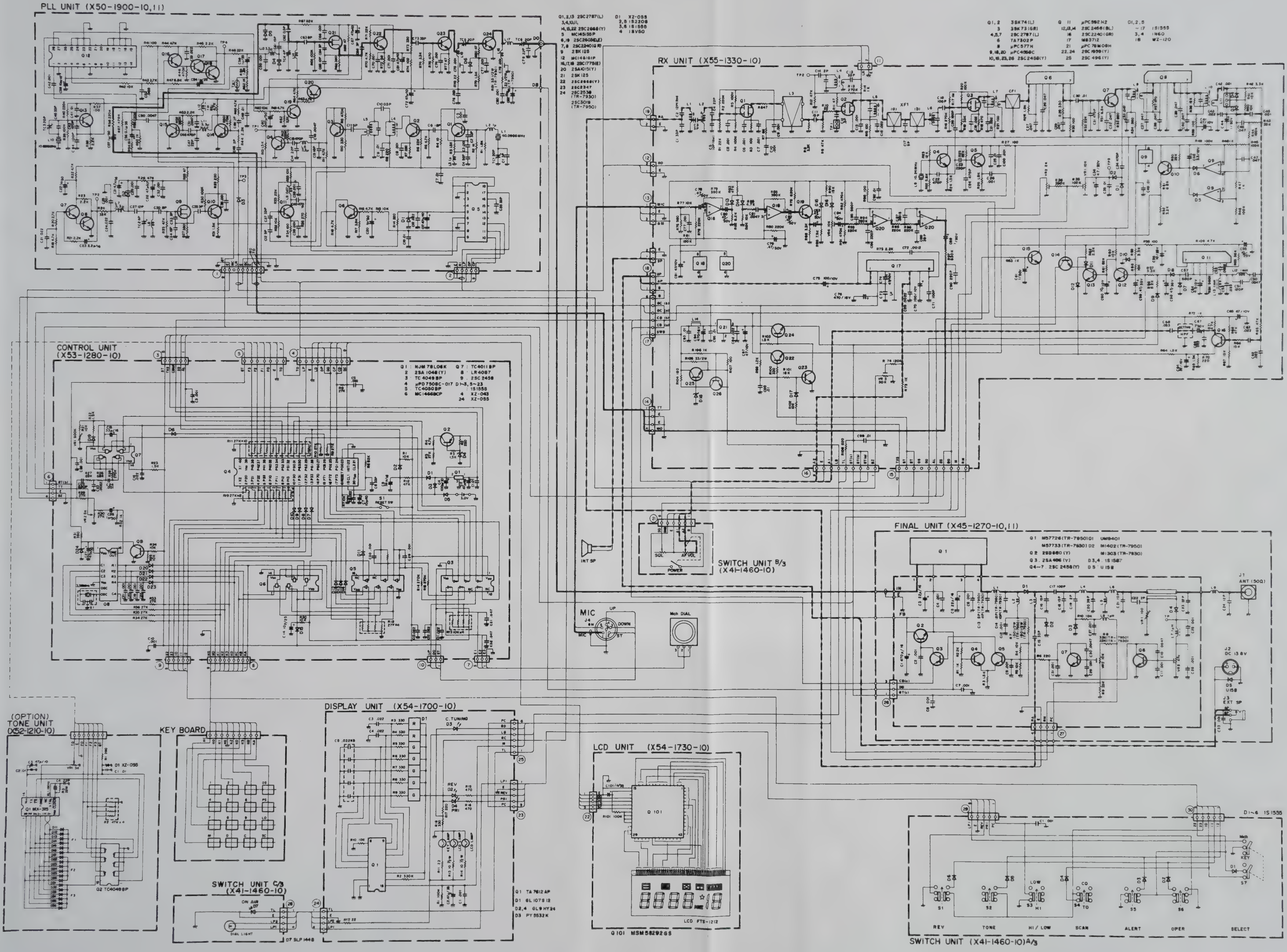
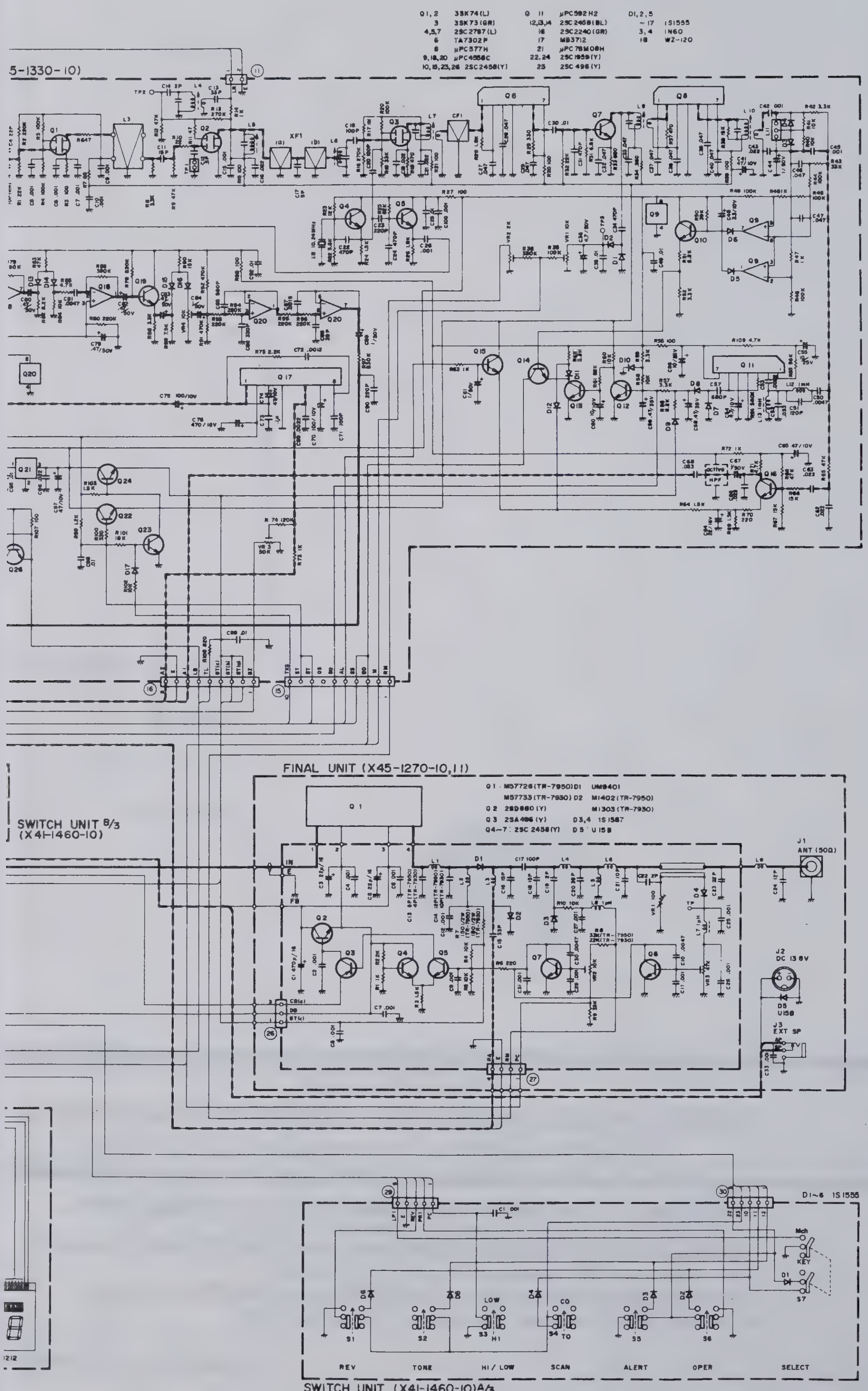
TR-7950/7930 SCHEMA



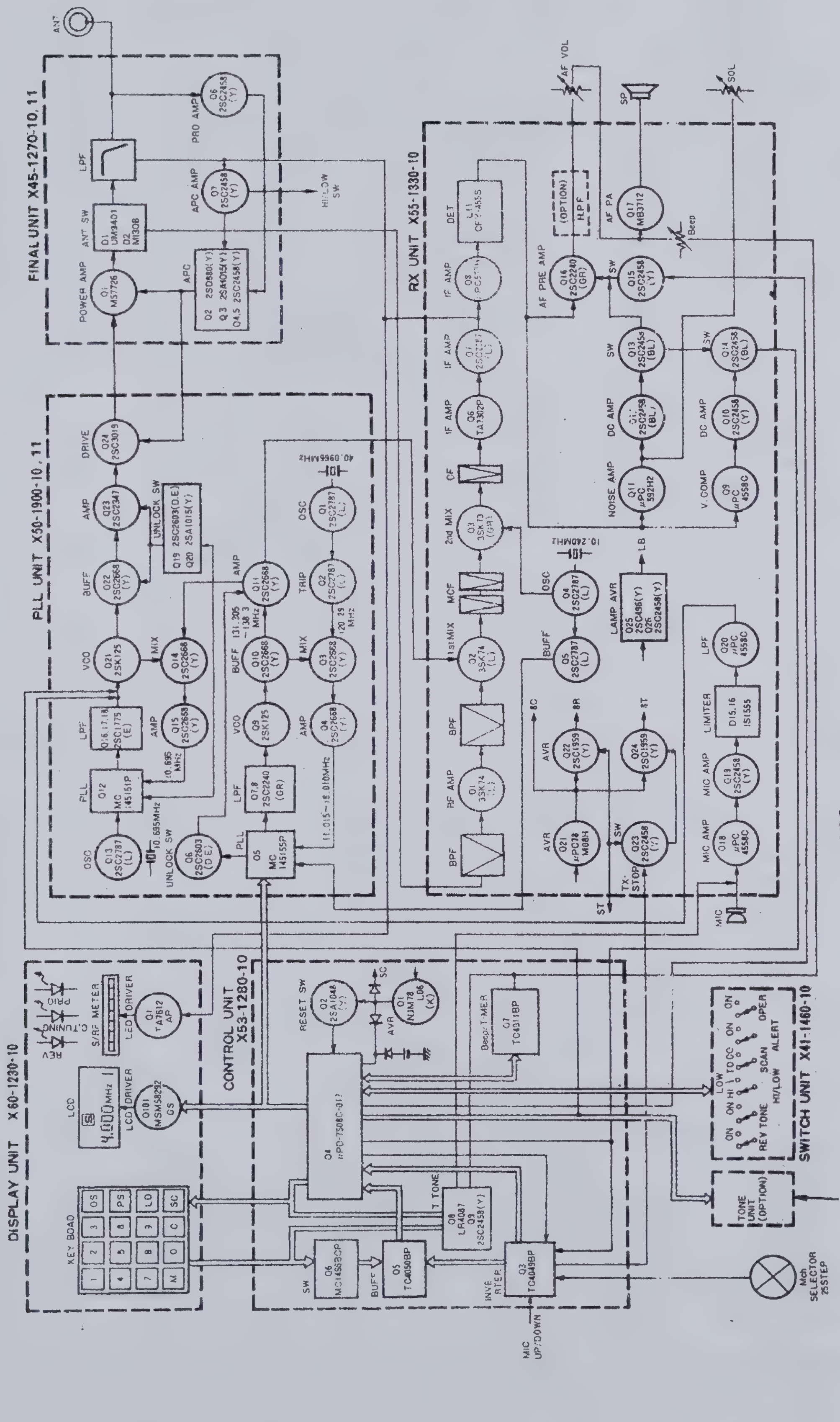
TR-7950/7930 SCHEMATIC DIAGRAM



ATIC DIAGRAM



BLOCK DIAGRAM



Note: For the TR-7930, the following parts are substituted:
Q1 – M57737
Q24 – 2SC2538

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TRIO-KENWOOD COMMUNICATIONS, GmbH
D-6374 Steinbach TS. Industriestrasse 8A, West Germany
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30 Whiting Street, Artarmon, Sydney N S W Australia 2064

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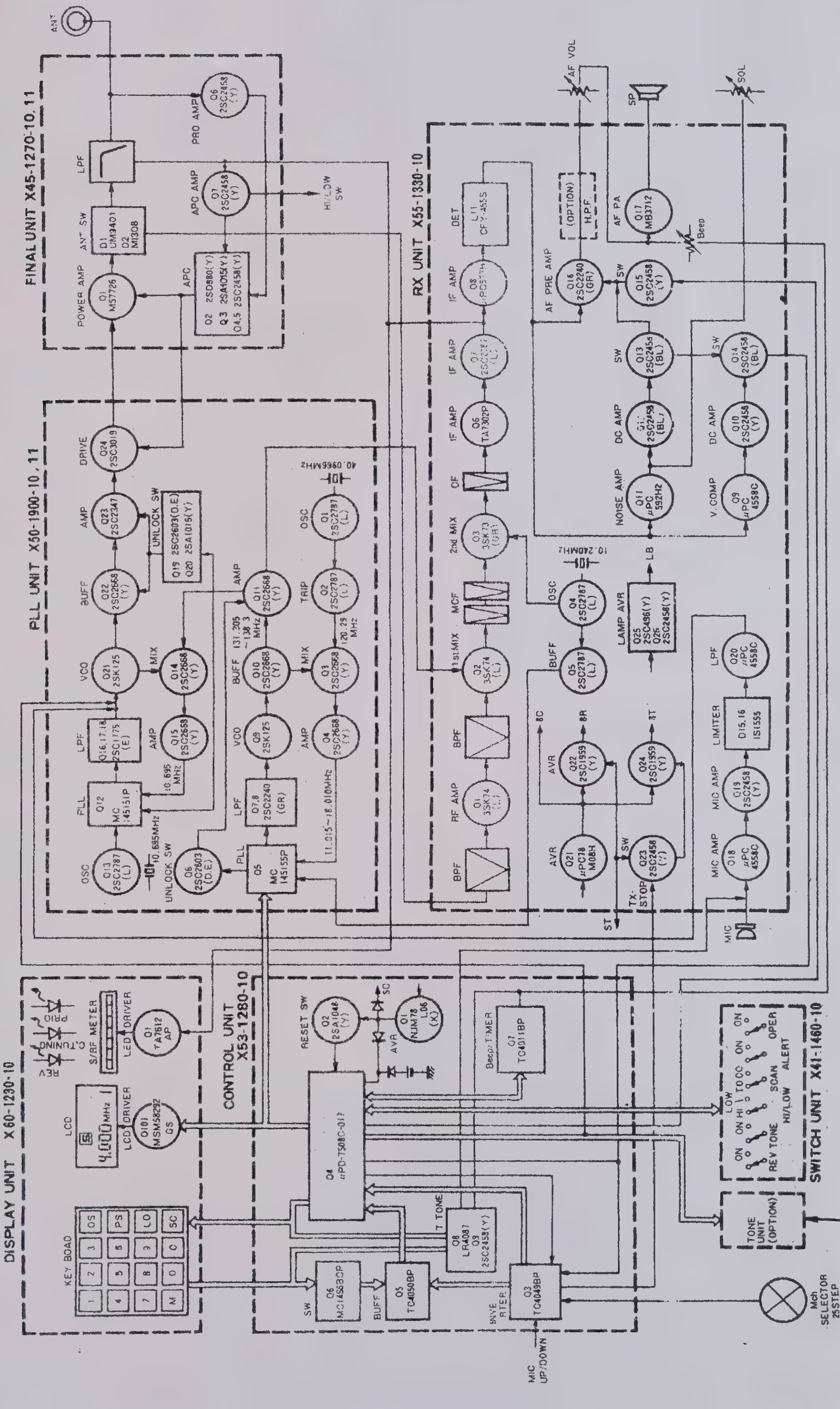
KENWOOD

2m FM TRANSCEIVER

Model TR-7950
TR-7930

INSTRUCTION MANUAL

BLOCK DIAGRAM



Note: For the TR-7930, the following parts are substituted:
Q1 – M57737
Q24 – 2SC2538

SPECIFICATIONS

[General]

Semiconductors	MPU	1
	ICs	19
	Transistors	43
	FETs	5
	Diodes	61 (K) (M), 60(T), 59(w)
Frequency range		144.000 to 147.995 MHz (K) (M)
		144.000 to 145.995 MHz (W) (T)
Frequency synthesizer		Digital control, phase locked VCO
Mode		FM (F3)
Antenna impedance		50 ohms
Power requirement		13.8V DC ±15%
Grounding		Negative
Operating temperature		–20°C to +50°C
Current drain		0.5A in receive mode with no input signal
	(TR-7950)	(Max.) 9.5A in HI transmit mode
	(TR-7930)	(Max.) 6.5A in HI transmit mode
	(TR-7950)	(Approx.) 3.0A in LOW transmit mode
	(TR-7930)	(Approx.) 2.5A in LOW transmit mode
Dimensions		175 mm (6 – 7/8) wide
		64 mm (2 – 1/2) high
		220 mm (8 – 11/36") deep (TR-7950),
		206 mm (8 – 1/16") deep (TR-7930)
		(projections excluded)
Weight		1.9 kg (4.18 lb) (TR-7950)
		1.8 kg (3.96 lb) (TR-7930)

[Transmitter Section]

RF output power (at 13.8V DC, 50Ω load)	HI	45 Watts min. (TR-7950)
		25 Watts min. (TR-7930)
	LOW	3 ~ 7W (TR-7950)
		2 ~ 6W (TR-7930)
Modulation		Phase shift
Frequency tolerance (–20°C ~ +50°C)		Less than $\pm 15 \times 10^{-6}$
Spurious radiation	HI	Less than –70 dB
	LOW	Less than –60 dB
Maximum frequency deviation (FM)		±5 kHz
Microphone		Dynamic microphone with PTT switch, 500Ω

[Receiver Section]

Circuitry		Double superheterodyne
Intermediate frequency	1st IF	10.695 MHz
	2nd IF	455 kHz
Receiver sensitivity		Better than 30 dB for 0.5 μV S+N/N
		Better than 12 dB for 0.25 μV SINAD
Receiver selectivity		More than 12 kHz (–6 dB)
		Less than 24 kHz (–60 dB)
Spurious response		Better than 70 dB
Squelch sensitivity		Less than 0.16 μV (threshold)
Auto scan step level		Less than 0.2 μV (threshold)
Audio output		More than 2.0 watts across 8 ohms load (5% dist.)

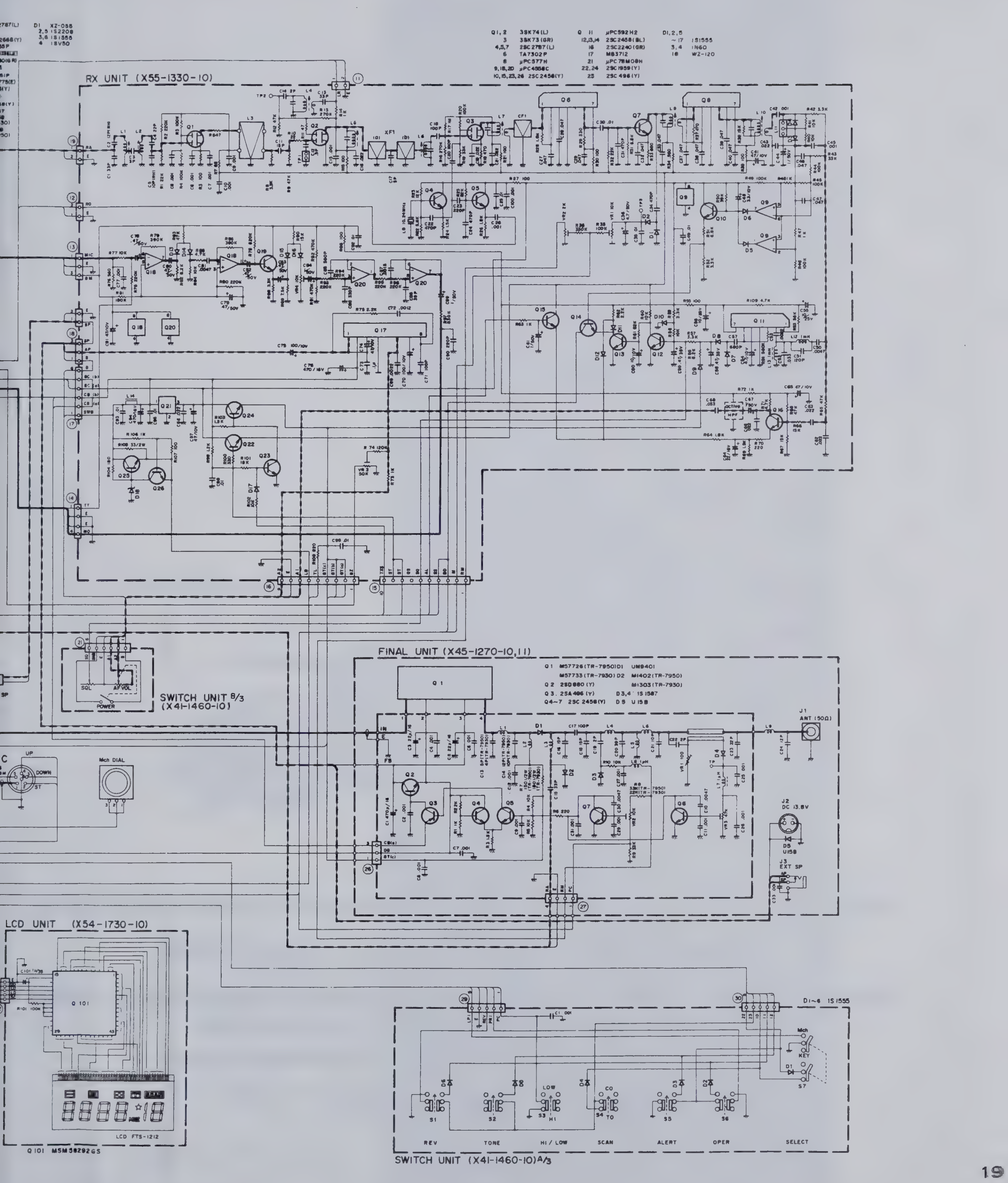
Note: Circuit and ratings are subject to change without notice due to developments in technology.

K_1,M_1,T_1,W_1 : TR-7950 (45W Type)
K_2,M_2,T_2,W_2 : TR-7930 (25W Type)
N : New Parts

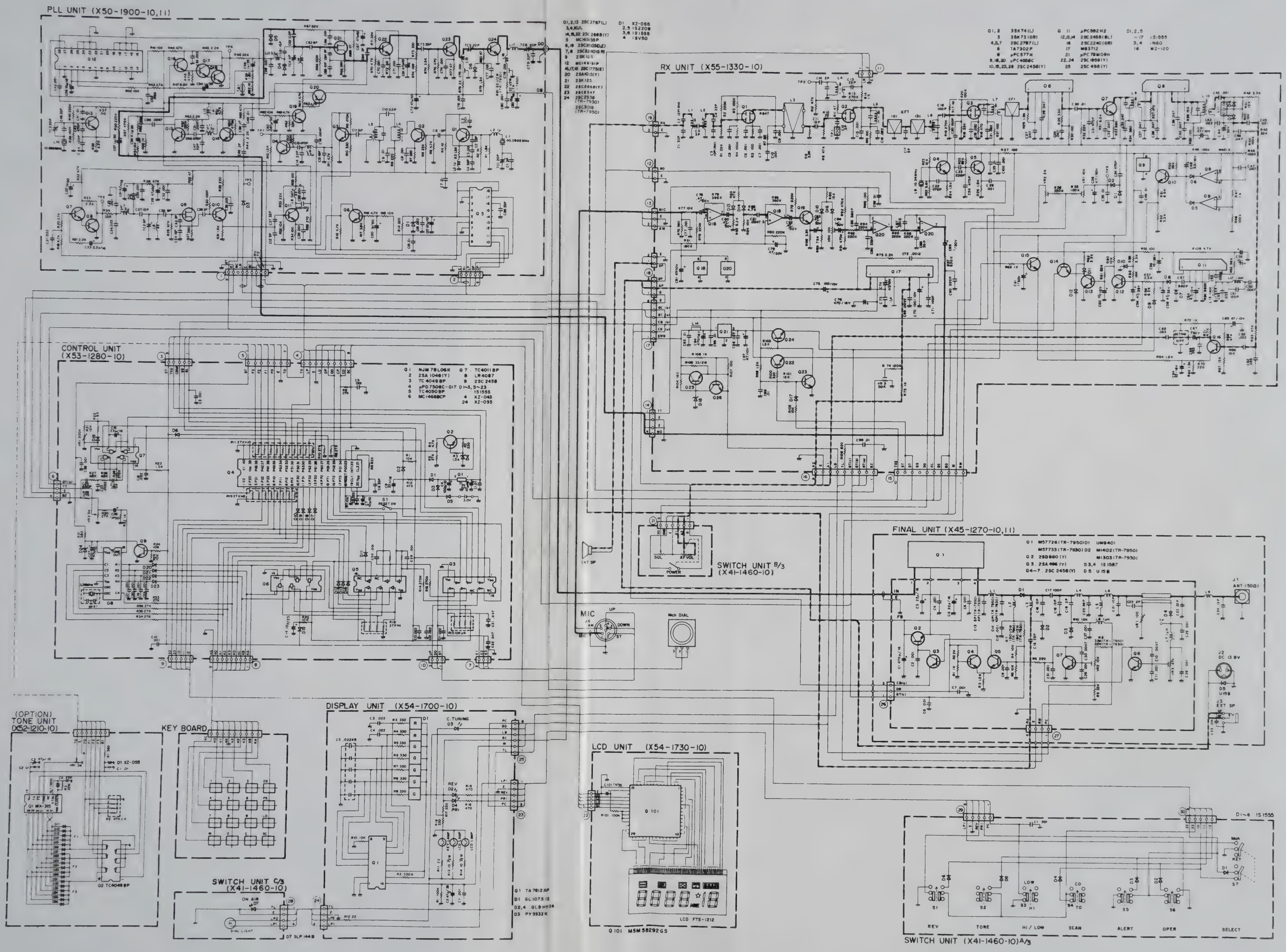
SEMI CONDUCTOR

Item	Name	Remarks
Diode	1N60	
	1S1555	
	1S1587	
	1S2208	
	1SV50	
	MI308	
	MI303	
	U15B	
	UM9401	
Zener Diode	WZ-120	
	XZ-043	
	XZ-055 K,M	
	XZ-060 T,W	
Thermistor	112-102-2	
LCD	FTS1212	N
LED	GL107S12	N
	GL9HY24	N
	PY5532K	
	SLP144B	
TR	2SA496 (Y)	
	2SA1015 (Y)	
	2SA1048 (Y)	
	2SC945 (O)	
	2SC1675 (L)	
	2SC1775 (E)	
	2SC1815 (Y)	
	2SC1815 (BL)	
	2SC1959 (Y)	
	2SC2240 (GR)	
	2SC2347	
	2SC2458 (Y)	
	2SC2458 (BL)	
	2SC2538-22-A K_2,M_2,T_2,W_2	
	2SC2603 (D,E)	
	2SC2668 (Y)	
	2SC2787 (L)	
	2SC3019 K_1,M_1,T_1,W_1	N
	2SD880 (Y)	
FET	2SK125	
	3SK73 (GR)	
	3SK74 (L)	
IC	AFG05F1750A2 T,W	
	LR4087 K,M	N
	MB3712	
	MC14066BCP	
	MC145155P *K	
	MC145151P	N
	NJM78L06K	
	MK5087N K,M	
	MSM58292GS	N
	TA7302P	
	TA7612AP	
	TC4011BP	
	TC4049BP	
	TC4050BP	N
	UPC577H	
	UPC592H2	N
	UPC78M08H	
	UPC4558C	
Micro-processor	UPD7508C-017	N
Power Module	M57726 K_1,M_1,T_1,W_1	
	M57737 K_2,M_2,T_2,W_2	N

SCHEMATIC DIAGRAM



TR-7950/7930 SCHEMATIC DIAGRAM



Model TR-~~7950~~/TR-7930

Serial No. 4061588

Date Purchase 6/11/

Dealer Name [illegible]

[illegible]

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17-5, 2-chome, Shibuya, Shibuya-ku, Tokyo, 150, Japan

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KENWOOD

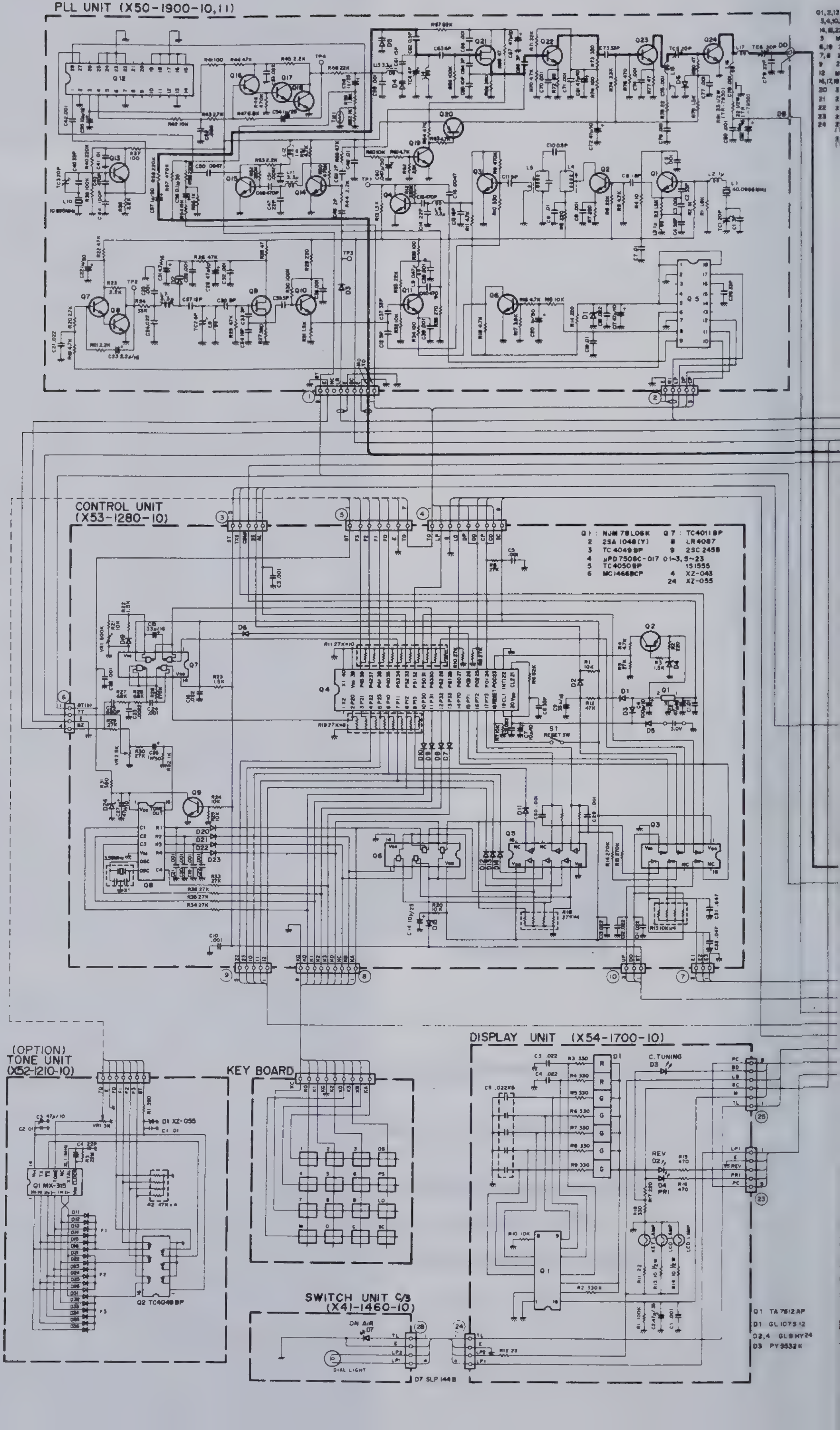
2m FM TRANSCEI

Model TR-795
TR-793

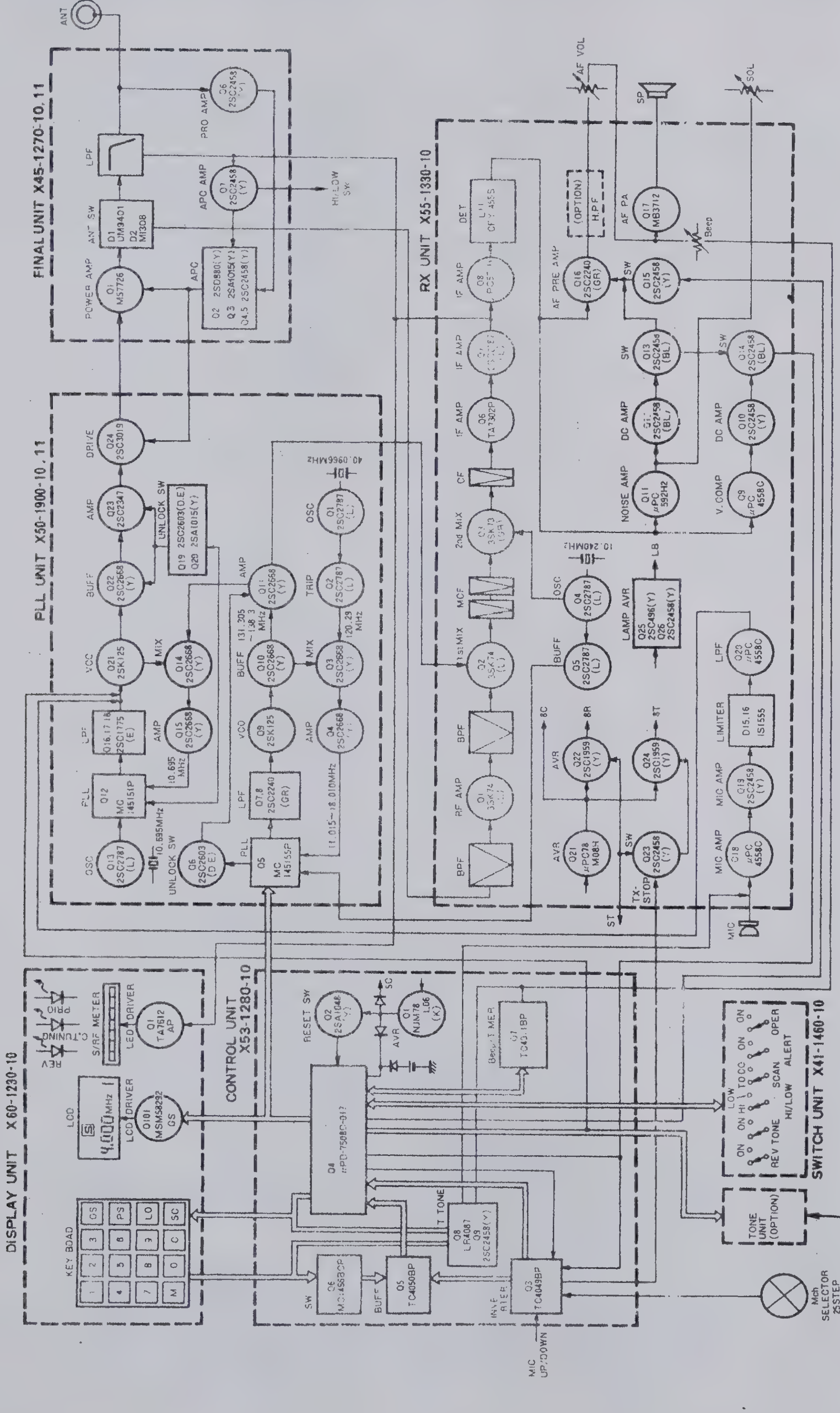
INSTRUCTION MANUAL

parts are substituted:
Q1 – M57737
Q24 – 2SC2538

TR-7950/793


PLL UNIT (X50-1900-10,11)
CONTROL UNIT
(X53-1280-10)
Q1 : NJM 78L06K
2 2SA 1048(Y)
3 TC 4049 BP
4 μPD7508C-017
5 TC4050BP
6 MC14568CP
Q7 : TC4011BP
8 LR4087
9 2SC 2458
D1~3, 5~23 1S1555
4 XZ-043
24 XZ-055
RESET SW
(OPTION)
TONE UNIT
(X52-1210-10)
Q1 MX-315
Q2 TC4049BP
D1 XZ-055
KEY BOARD
DISPLAY UNIT (X54-1700-10)
C.TUNING
REV
PRI
Q1 TA7612AP
D1 GL1075 12
D2,4 GL9HY24
D3 PY5532K
SWITCH UNIT C/3
(X41-1460-10)
ON AIR
DIAL LIGHT
D7 SLP144B

BLOCK DIAGRAM

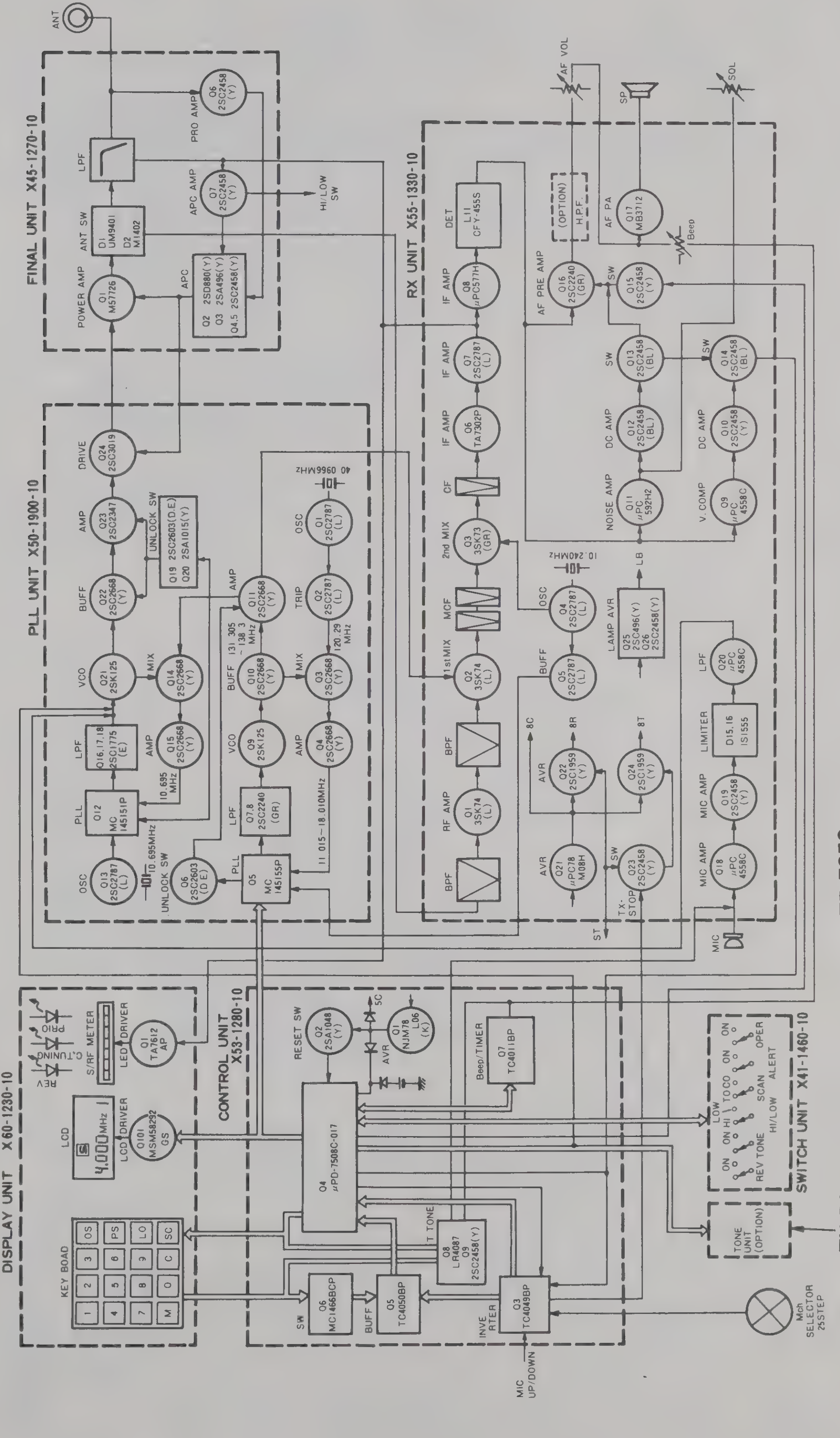


Note: For the TR-7930, the following parts are substituted:

Q1 – M57737

Q24 – 2SC2538

BLOCK DIAGRAM

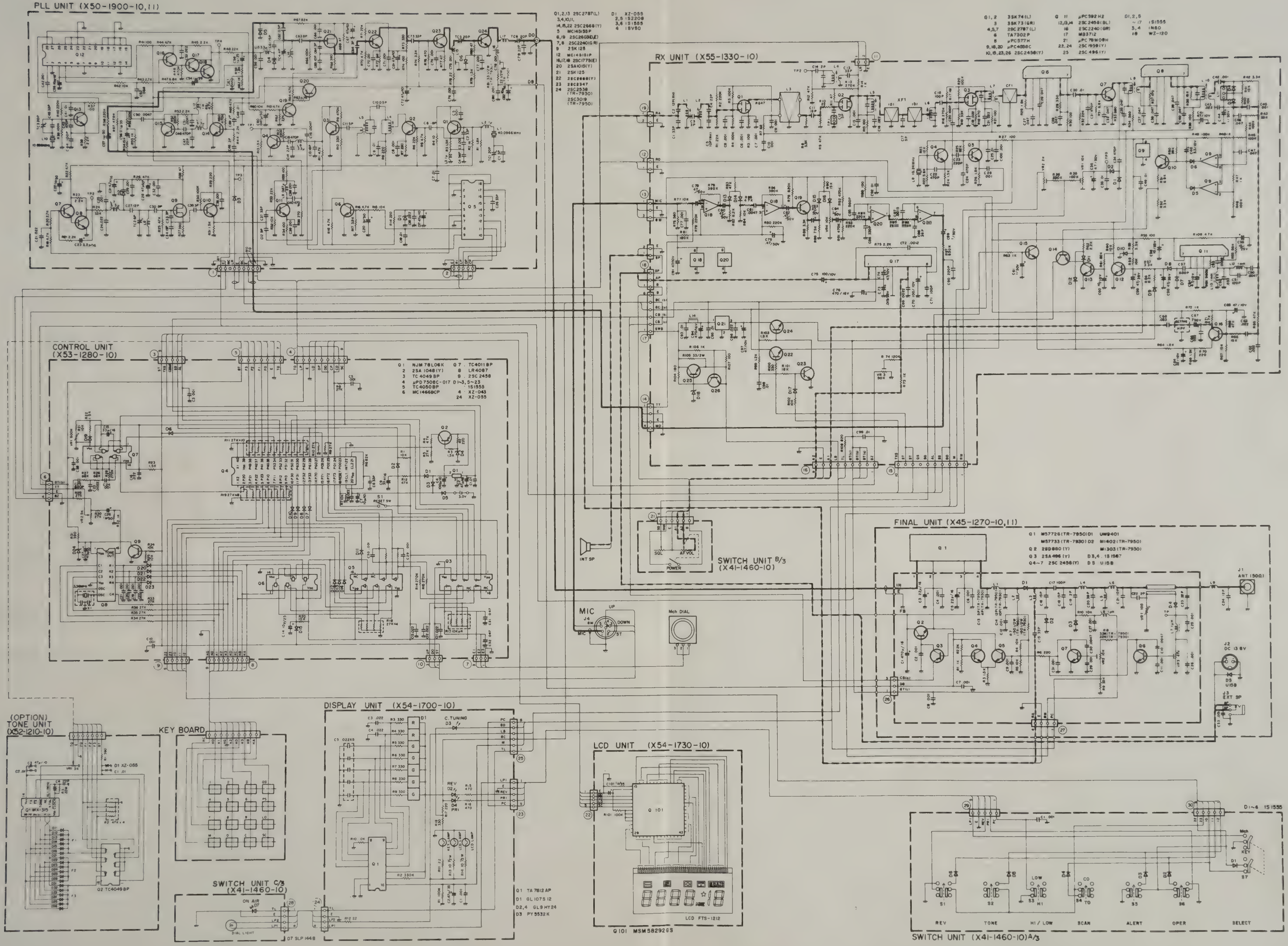


TR-7950

Note: For the TR-7930, the following parts are substituted:

Q1 – M57737
Q24 – 2SC2538
D2 – M1303

TR-7950/7930 SCHEMATIC DIAGRAM



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See INSTR. Manual
for orig —

Classification: Rentals. Vacation Places - Beaches
Score: 1.00, Entered: 07/01/99 01:15:53

MYRTLE BEACH-Ocean front
1-3BR Condos & Penthouses
Discounts $49-$89/nite-free
Brochure/800-777-9411/SR Inc.

Classification: Rentals, Vacation Places - Beaches
Score: 1.00, Entered: 07/02/99 01:27:36

Charleston - Wild Dunes, 3BR/3BA beach front villa, pool. 864/
Classification: Rentals, Vacation Places - Beaches
Score: 1.00, Entered: 07/02/99 01:27:27

MYRTLE BEACH
NEW CONDOS. Near golf, shopping, 10 mins. to beach. 2br, 2
231-1367

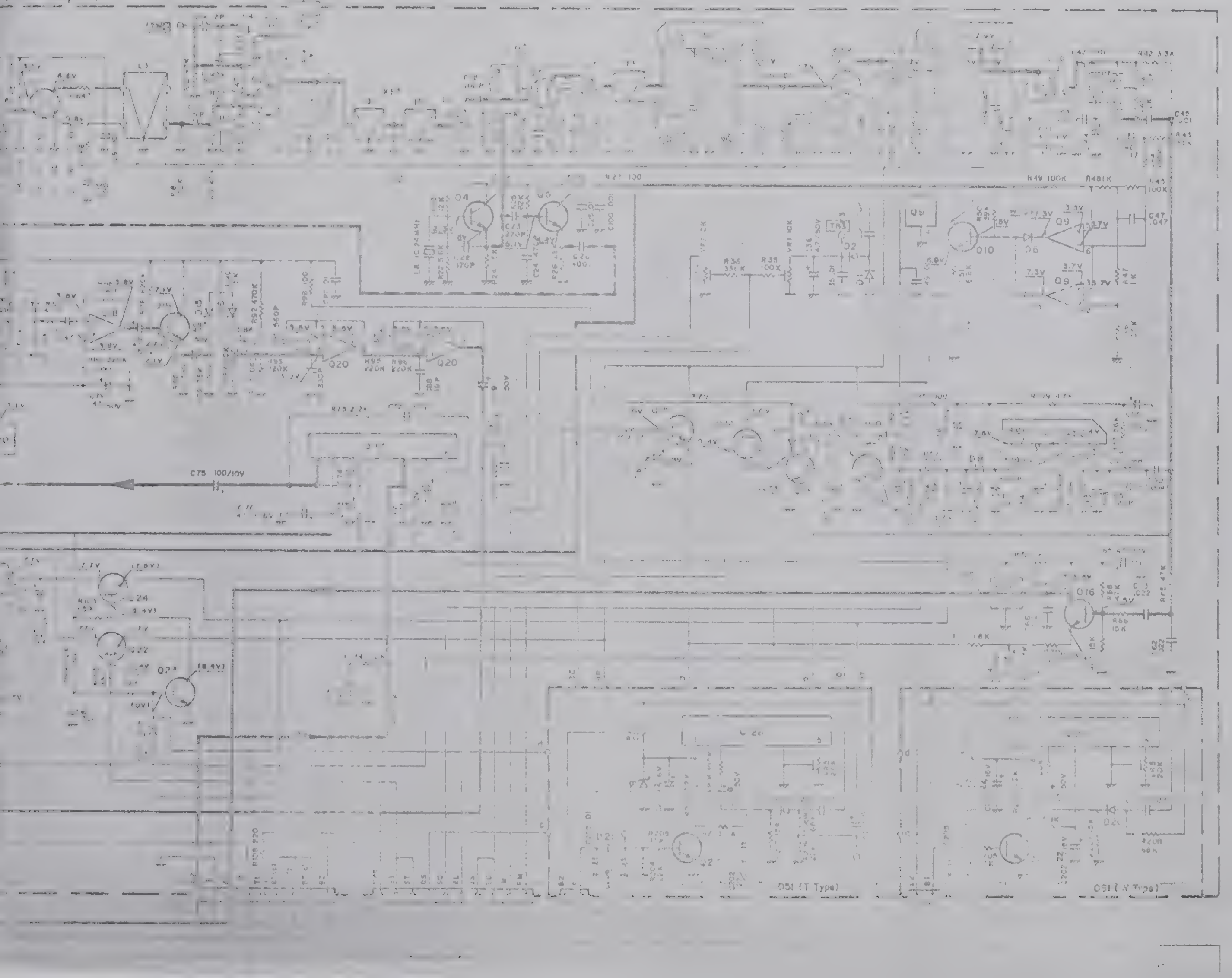
Classification: Rentals, Vacation Places - Beaches
Score: 1.00, Entered: 07/02/99 01:27:34

Another Search

IAGRAM (W, T)

TR-7930/TR-7930

Q1 : 3SK74[illegible] Q11 : μPC592H2 Q28 : AF(05F1750A2
[illegible] D1,2,5~17
[illegible] 20,21 T) : [illegible]1555
[illegible] : TA7[illegible] [illegible] : MD[illegible] 3,4 : IN[illegible]
[illegible] : μPC5[illegible]H 21 : μPC78M08H 18 : W[illegible] 20
[illegible] 22,24 : 2SC1959(Y) 14 : X[illegible] 60
10,[illegible],23,26,27 : 2SC2438(Y) 25 : 2SC496(Y)



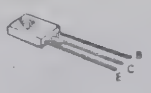
———— Signal line
- - - - - - Control line
———— Common DC line

Voltage measurement conditions.

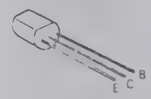
F = 145.995 MHz

( ) : TX

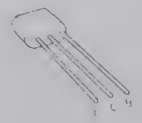
2SA496
2SC496



2SA1015(Y)
2SC945(Q)
2SC1675(L)
2SC1775(E)
2SC1815(Y, BL)
2SC1959(Y)
2SC2240(GR)



2SC2603(D, E)
2SC2787(L)



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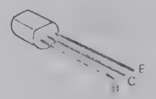
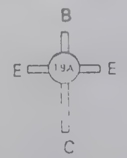


2SC3019



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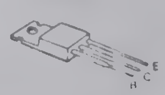

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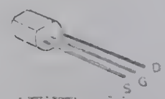
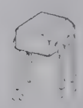


3SK73(GR)



3SK74(L)

AFG05F1750A2

Classification: Rentals. Vacation Places - Beaches
Score: 1.00, Entered: 07/01/99 01:15:53

MYRTLE BEACH-Ocean front
1-3BR Condos & Penthouses
Discounts $49-$89/nite-free
Brochure/800-777-9411/SR Inc.

Classification: Rentals, Vacation Places - Beaches
Score: 1.00, Entered: 07/02/99 01:27:36

Charleston - Wild Dunes, 3BR/3BA beach front villa, pool. 864/
Classification: Rentals, Vacation Places - Beaches
Score: 1.00, Entered: 07/02/99 01:27:27

MYRTLE BEACH
NEW CONDOS. Near golf, shopping, 10 mins. to beach. 2br, 2b
231-1367

Classification: Rentals, Vacation Places - Beaches
Score: 1.00, Entered: 07/02/99 01:27:34

SCHEMATIC DIAGRAM (W, T)

TR-7950/TR-7930

Signal line

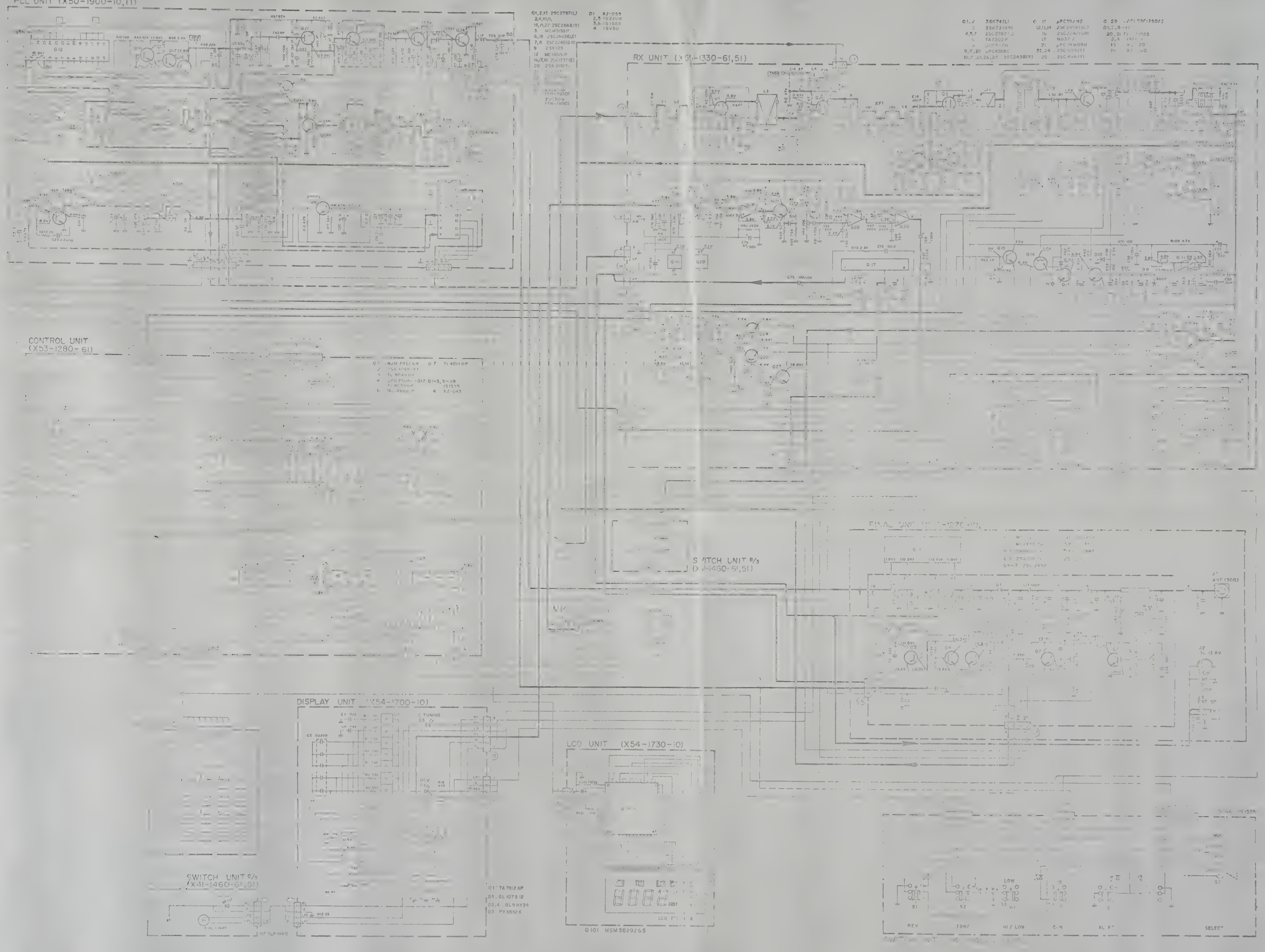
Control line

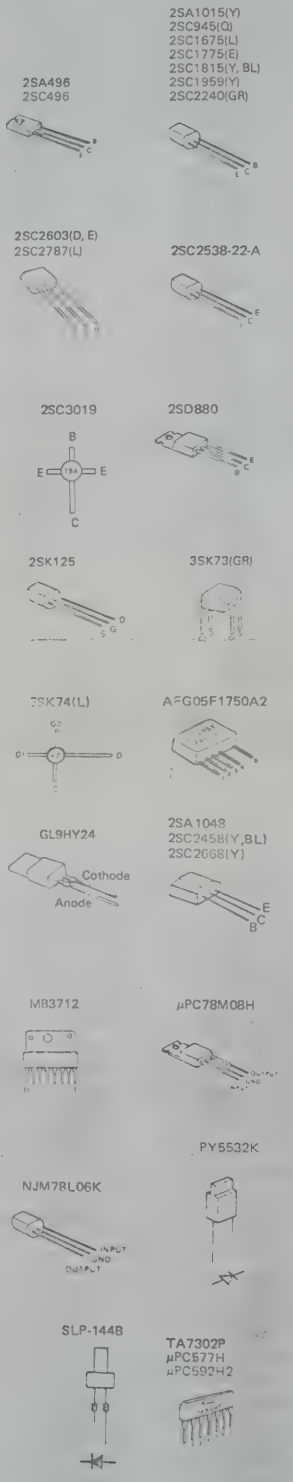
Common DC line

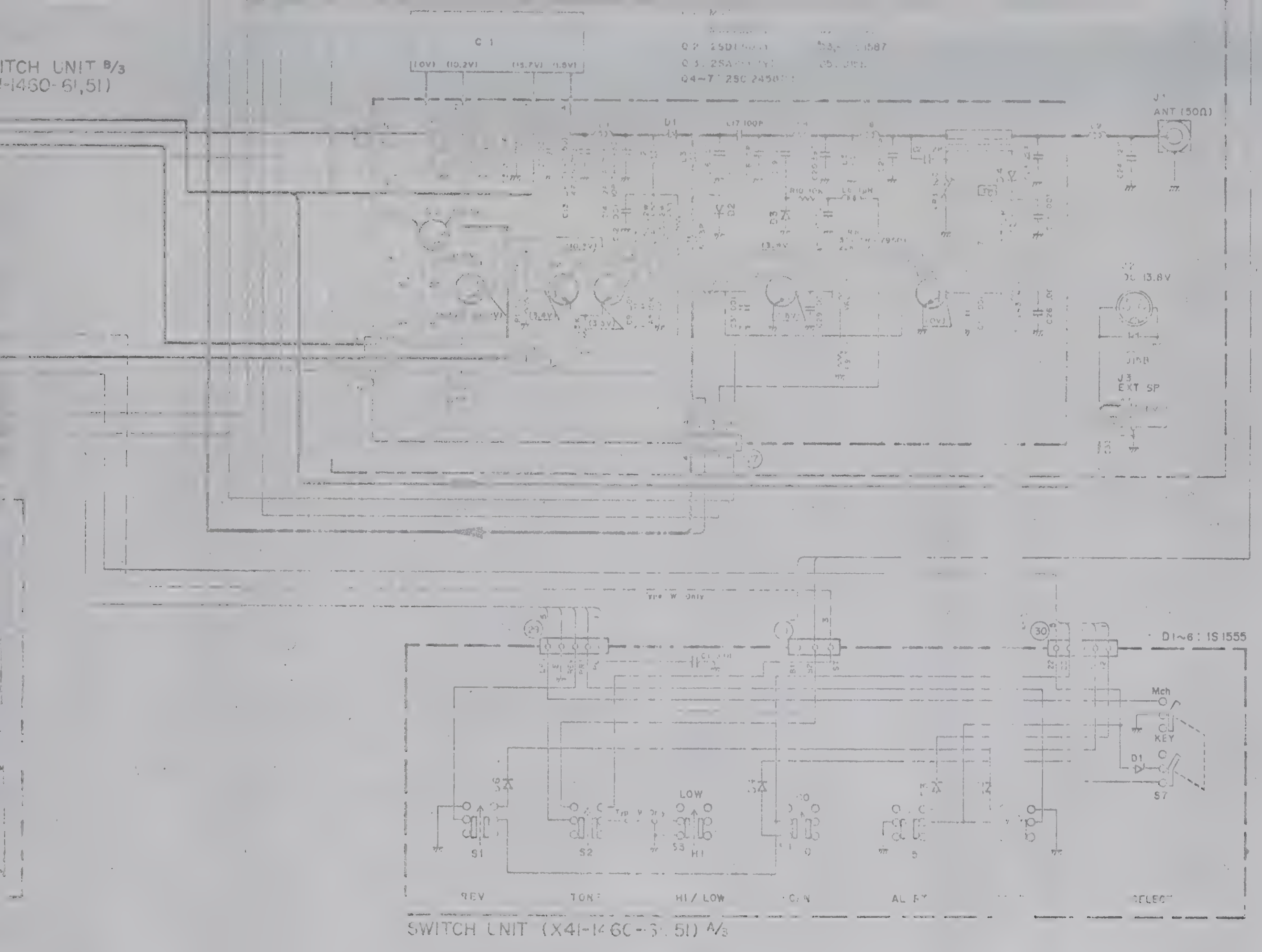
Voltage measurement conditions.

F = 145.995 MHz

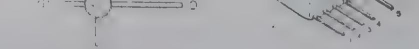
(   ) : TX



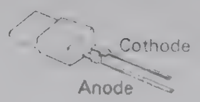




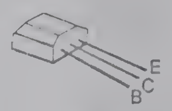
SWITCH UNIT (X41-1460-31,51) A/3



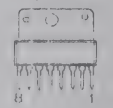
GL9HY24



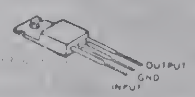
2SA1048
2SC2458(Y,BL)
2SC2668(Y)



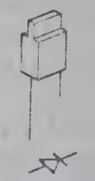
MB3712



μPC78M08H



PY5532K



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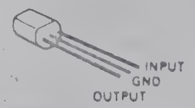
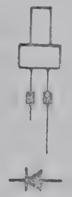
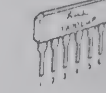


SLP-144B



TA7302P
μPC577H
μPC592H2

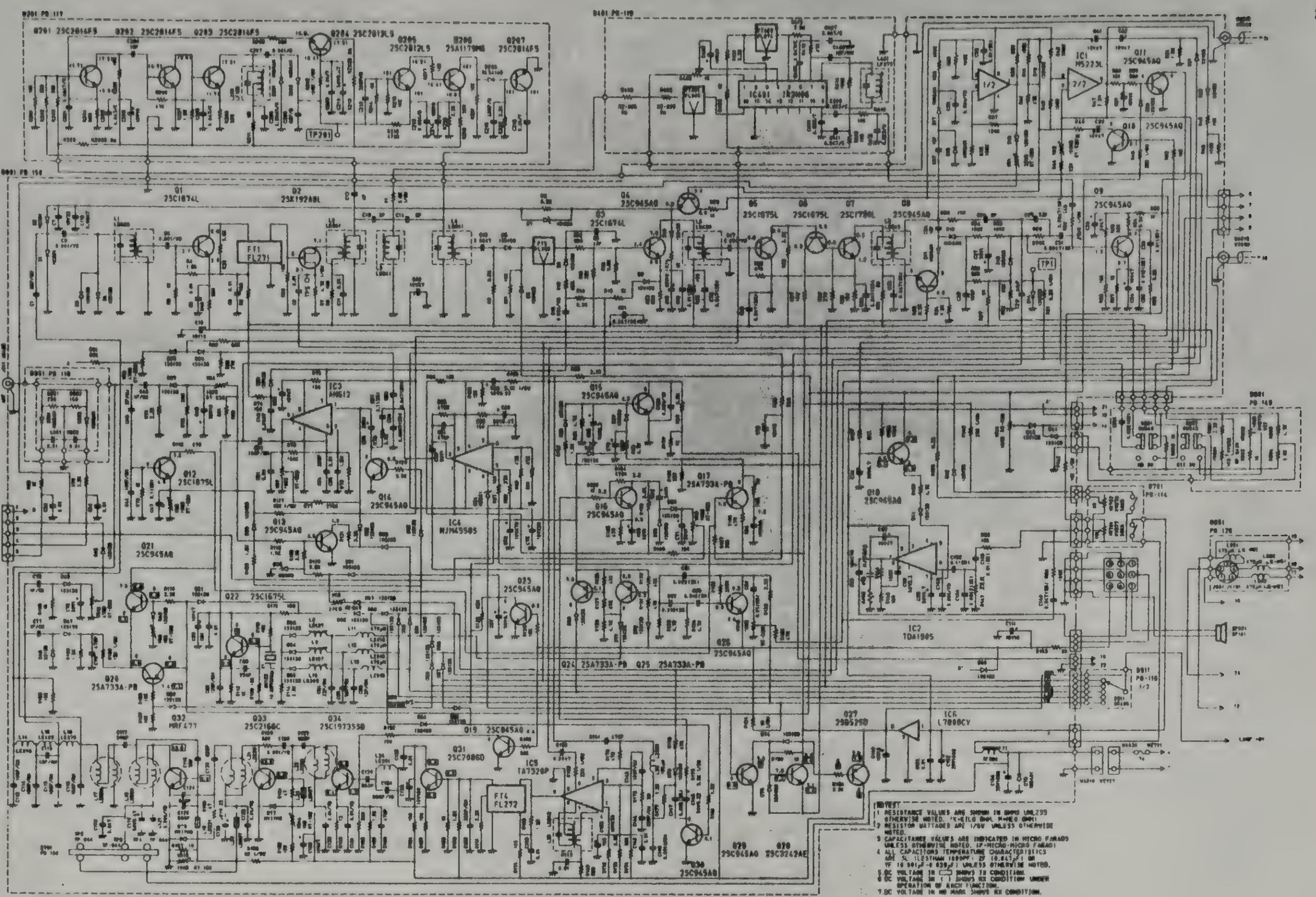


KENWOOD

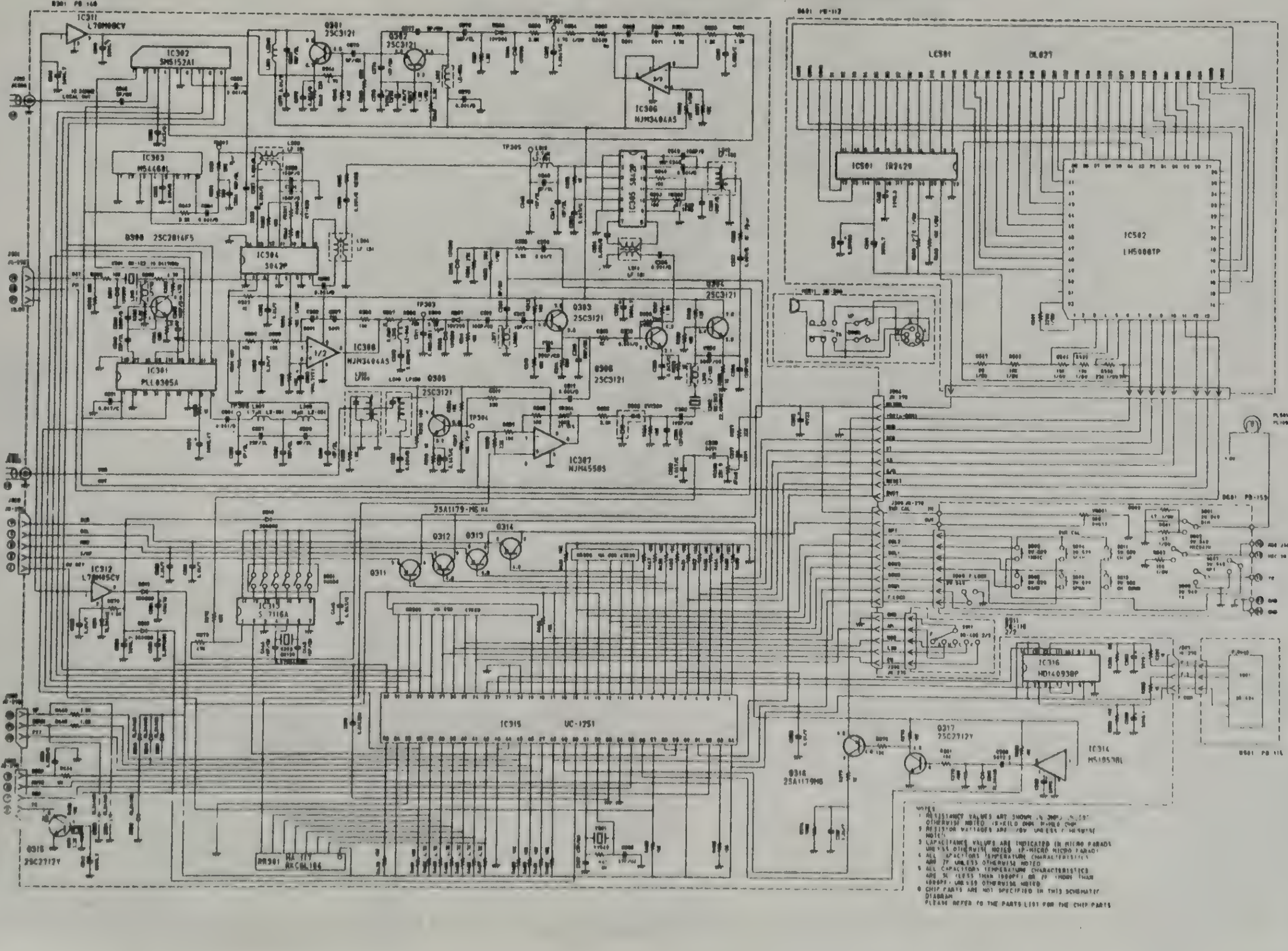
2m FM TRANSCEIVER

Model TR-7950
TR-7930

INSTRUCTION MANUAL



NOTES:
1. RESISTANCE VALUES ARE SHOWN IN OHMS UNLESS OTHERWISE NOTED. (K=KILO OHM, M=MEG OHM)
2. RESISTOR WATTAGES ARE 1/6W UNLESS OTHERWISE NOTED.
3. CAPACITANCE VALUES ARE INDICATED IN MICRO FARADS UNLESS OTHERWISE NOTED. (P=MICRO-MICRO FARAD)
4. ALL CAPACITORS TEMPERATURE CHARACTERISTICS ARE SL (LESS THAN 1000PF) (0.047μF) OR YF (0.001μF-0.039μF) UNLESS OTHERWISE NOTED.
5. DC VOLTAGE IN ▭ SHOWS TX CONDITION.
6. DC VOLTAGE IN ( ) SHOWS RX CONDITION UNDER OPERATION OF EACH FUNCTION.
7. DC VOLTAGE IN NO MARK SHOWS RX CONDITION.



NOTES
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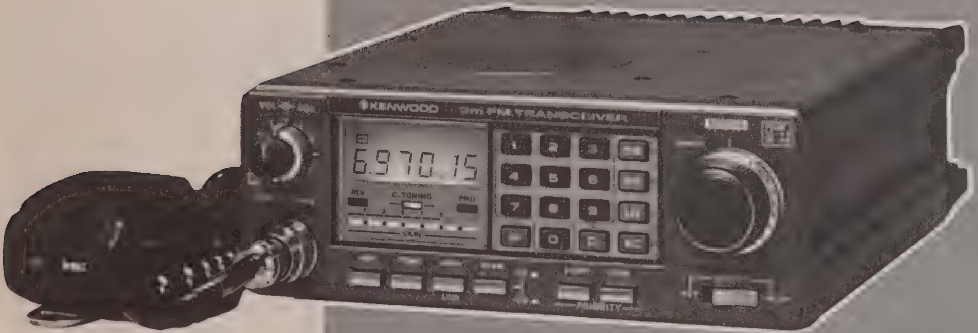
4. ALL CAPACITORS TEMPERATURE CHARACTERISTICS ARE YF UNLESS OTHERWISE NOTED.
5. ALL CAPACITORS TEMPERATURE CHARACTERISTICS ARE SL (LESS THAN 1000PF) OR YF (MORE THAN 1000PF) UNLESS OTHERWISE NOTED.
6. CHIP PARTS ARE NOT SPECIFIED IN THIS SCHEMATIC DIAGRAM.
PLEASE REFER TO THE PARTS LIST FOR THE CHIP PARTS.

KENWOOD

2m FM TRANSCEIVER

Model TR-7950
TR-7930



INSTRUCTION MANUAL

INTRODUCTION

You are the owner of our latest product, the new TR-7950 (or TR-7930) transceiver. Please read this instruction manual carefully before placing your transceiver in service. The unit has been carefully engineered and manufactured to rigid quality standards, and should give you satisfactory and dependable operation for many years.

AFTER UNPACKING

- Shipping container:
  Save the boxes and packing in the event your unit needs to be transported for remote operation, maintenance, or service.
- The following explicit definitions apply in this manual:
  Note: If disregarded, inconvenience only, no risk of equipment damage or personal injury.
  Caution: Equipment damage may occur, but not personal injury.

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■ ACCESSORIES

Carefully unpack your TR-7950 (or TR-7930) and check that it is supplied with the following accessories:

(1) Dynamic microphone (with U/D switch)
(T91-0313-05) .... 1 piece
(2) Mounting Bracket
Mounting parts:
Hex wrench (w01-0401-04) .... 1 piece
Nuts (5 mm diameter)
(N14-0510-04) .... 4 pieces
Hex-socket screw
(N09-0008-04) .... 4 pieces
Flat washers (6 mm diameter)
(N15-1060-46) .... 4 pieces
Spring washer (6 mm diameter)
(N16-0060-46) .... 4 pieces
(3) Foot
Rubber foot (small, rear)
(J02-0069-05) .... 2 pieces
Rubber foot (large, front)
(J02-0070-05) .... 2 pieces
Screw (N30-3006-41) .... 4 pieces
(4) DC power cord (with 2P plug and fuse)
TR-7950(E30-1685-05)/
TR7930(E30-1674-05) .... 1 piece
(5) Spare fuse
TR-7950(10A) (F05-1031-05) .... 1 piece
TR-7930(8A) (F05-8021-05) .... 1 piece
(7) Miniature plug (for external speaker)
(E12-0001-15) .... 1 piece
(9) Warranty card .... 1 copy
(10) Instruction manual .... 1 copy

FEATURES

Outstanding features providing maximum ease of operation include a large backlighted, easy-to-read (either in direct sunlight or in the dark) LCD display, 21 multi-function memories, automatic offset, programmable priority channel, memory and programmable band scans, built-in lithium battery memory back-up, built-in 16-key autopatch, and the choice of a hefty 45 watts output (TR-7950), or 25 watts output (TR-7930).

TR-7950 FEATURES:

- **NEW, large, easy-to-read LCD digital display**
  Easy to read in direct sunlight or in the dark (backlighted). Displays transmit/receive frequencies, memory channel, repeater offset, (+, S, –), sub-tone number (F-0, 1, 2, 3), tone scan, and memory scan lock-out. Includes LED S/RF bar meter, and LED indicators for REVERSE, CENTER TUNING, PRIORITY, and ON AIR.
- **21 NEW, multi-function memory channels**
  Sotes frequency, repeater offset, and optional sub-tone channels. Memories 1 through 15 for simplex for ±600 kHz offset. Memory pairs 16/17, and 18/19 are paired for non-standard repeater offset. Memories "A" and "B" set upper and lower scan limits, or for simplex or ±600 kHz offset. In MEMORY mode, a circle of light appears around the memory selector knob. When the memory selector knob is rotated in either direction to channel 1, and audible "beep" will sound for visually impaired operators.
- **Choise of 45 or 25 watts output**
  The TR-7950 provides a hefty 45 watts output, while the TR-7930 features a more modest 25 watts. A HI/LOW power switch allows power reduction to approx. 5 watts(adjustable).
- **Long-life lithium battery memory back-up**
  Built-in lithium battery has an estimated 5 year life.
- **Automatic offset**
  The microprocessor is pre-programmed for simplex or ±600 kHz offset, in accordance with the ARRL 2 meter band plan. "OS" key allows manual offset change.
- **Programmable priority alert**
  The PRIORITY channel may be programmed as any one of the 21 memories, with the ALERT switch "ON," a dual "beep" sounds when a signal is present on the PRIORITY channel. The OPER switch allows and instant move to the PRIORITY channel.
- **Programmble memory scan lock-out**
  "LO" key for programming the scan to skip selected memory channels, without erasing the memory.

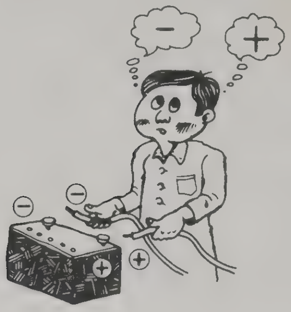
The lower limit may be programmed into memory "A" and the upper limit into memory "B".

- **Center stop during band-scan, with indicator**
  Stops on a channel center during band-scan, with center tuning indicator.
- **Scan resume selectable**
  Scan stops on busy channel. Selectable automatic time resume-scan (approx. 5 sec., adjustable), or carrier operated resume-scan. a scan delay after carrier-drop of approx. 1.5 seconds is built-in.
- **Scan control using up/down microphone**
  Momentarily pressing UP or DWN button on microphone tunes one step in the selected direction, on memory or on 5-kHz step tuning. Holding the button for about 2 seconds starts UP or DWN automatic scan action. Scan also starts using "SC" key on keyboard. Scan may be cancelled by momentarily pressing the PTT switch or by pressing both UP/DWN buttons simultaneously.
- **Programmable sub-tone channels**
  Optional TU-79 three frequency sub-tone unit provides keyboard selectable sub-tone channels, which may be stored in memory.
- **Built-in 16-key autopatch, with adjustable monitor**
  The keyboard functions as a 16-key autopatch during transmit. DTMF tones appear in the speaker output when a key is pressed during transmit.
- **Front panel keyboard control**
  Used for selecting frequent panel keyboard control.
  Used for selecting frequency offset, programming memories, controlling scan, and autopatch encode. Keyboard night lighting is provided.
- **Extended frequency coverage**
  covers 142.000-148.995 MHz, in 5-kHz steps.
- **Repeater reverse switch**
  Locking-type switch, with indicator.
- **"Beeper" amplified through speaker (Level adjustable)**
- **Compact, lightweight design**
- **Easy-to-install adjustable-angle mobile mounting bracket**

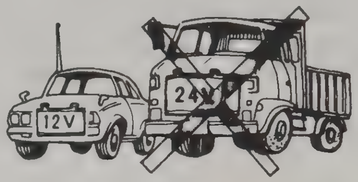
Optional accessories:

- TU-79 three frequency diode programmable tone unit.
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7A fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.

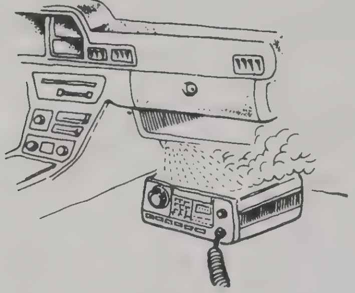
BEFORE USE



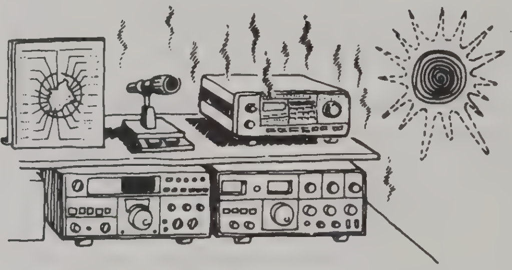
BEFORE connection, check polarity.



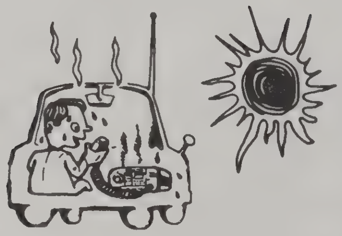
This unit is designed for 12V negative ground ONLY.



Do not install near heater outlet.



Keep equipment away from heat and out of direct sunlight.



After parking in the sun, or if inside temperature is HOT, cool this unit BEFORE transmitting.

Do not adjust coil, trimmers, or pots! These are factory adjustments.

SPECIFICATIONS

[General]

Semiconductors	MPU	1
	ICs	19
	Transistors	43
	FETs	5
	Diodes	61
Frequency range	144.000 to 147.995 MHz	
Frequency synthesizer	Digital control, phase locked VCO	
Mode	FM (F3)	
Anntenna impedance	50 ohms	
Power requirement	13.8V DC ±15%	
Grounding	Negative	
Operating temperature	–20°C to +50°C	
Current drain	0.5V in reverive mode with no input singal	
	Max. 9.5A in HI transmit mode (TR-7950)	
	3.0A in LOW transmit mode (TR-7950)	
	Max. 6.5A in HI tramsmit mode (TR-7930)	
	2.5A in LOW transmit mode (TR-7930)	
Dimension	175 mm (6 – 7/8) wide	
	64 mm (2 – 1/2) high	
	220 mm (8 – 11/36") deep (TR-7950)	
	206 mm (8 – 1/16") deep (TR-7930)	
	(projections excluded)	
Weight	1.9 kg (4.18 lb) (TR-7950)	
	1.8 kg (3.96 lb) (TR-7930)	

[Transmitter]

RF output power (at 13.8V DC, 50Ω load)	HI 45 Watts min. (TR-7950)	
	HI 25 Watts min. (TR-7930)	
	LOW 5 Watts approx. (not adjustable)	
Modulation	Phase sift	
Frequency tolerance (–20°C ~ +50°C)	Less than $\pm 15 \times 10^{-6}$	
Spurious radiation	HI	Less than –70 dB
	LOW	Less than –60 dB
Maximum frequency deviation (FM)	±5 kHz	
Audio response	Within +1/–3 dB of 6 dB/oct pre-emphais characteristic from 300 to 3000 Hz.	
Audio distortion	3% max.	
Microphone	Dynamic microphone with PTT switch, 500Ω	

[Receiver]

Circuitry	Double superheterodyne	
Intermediate frequency	1st	10.695 MHz
	2nd	455 kHz
Receiver sensitivity	Better than 30 dB for 0.5 µV S+N/N	
	Better than 12 dB for 0.25 µV SINAD	
Receiver selectivity	More than	12 kHz (–6 dB)
	Less than	24 kHz (–60 dB)
Spuriour response	Better than	70 dB
Squelch sensitivity	Less than	0.16 µV (threshold)
Auto scan stop level	Less than	0.2 µV (threshold)
Audio output	More than 2.0 watts across 8 ohms load (5% dist.)	

Note: Circuit and ratings are subject to change without notice due to developments in technology.

SECTION 1 INSTALLATION

1-1. Interconnection

Connect the antenna and power supply as shown in Fig. 1-1 for fixed station.

1-2. MOBILE Installation, [general]

- **Installation location**

Using the supplied mounting bracket, install the transceiver under the dashboard or on the side of the console in your car.
Refer to Fig. 1-2A and Fig. 1-2B on page 7.
If your car is equipped with and electronic fuel injector, the transceiver should be as far from the control equipment as possible.

- **Antenna installation**

Various types of antennas for 2 meter mobile operation are available. (See Fig. 1-2C)

NOTE:
For gutter-mount installation, the antenna bracket must be grounded to the car body as shown in Fig. 1-2C. Affix the antenna securely, referring to the antenna instruction.

- **Power supply**

Connect the supplied power cable with fuse directly to the battery terminals. Connecting to the cigarette lighter socket can cause a poor connection, and excessive voltage drop.

- **Ignition noise**

The transceiver is designed to supress ignition noise; however, if excessive noise is present, it may be necessary to use suppressor spark plugs (with resistors).

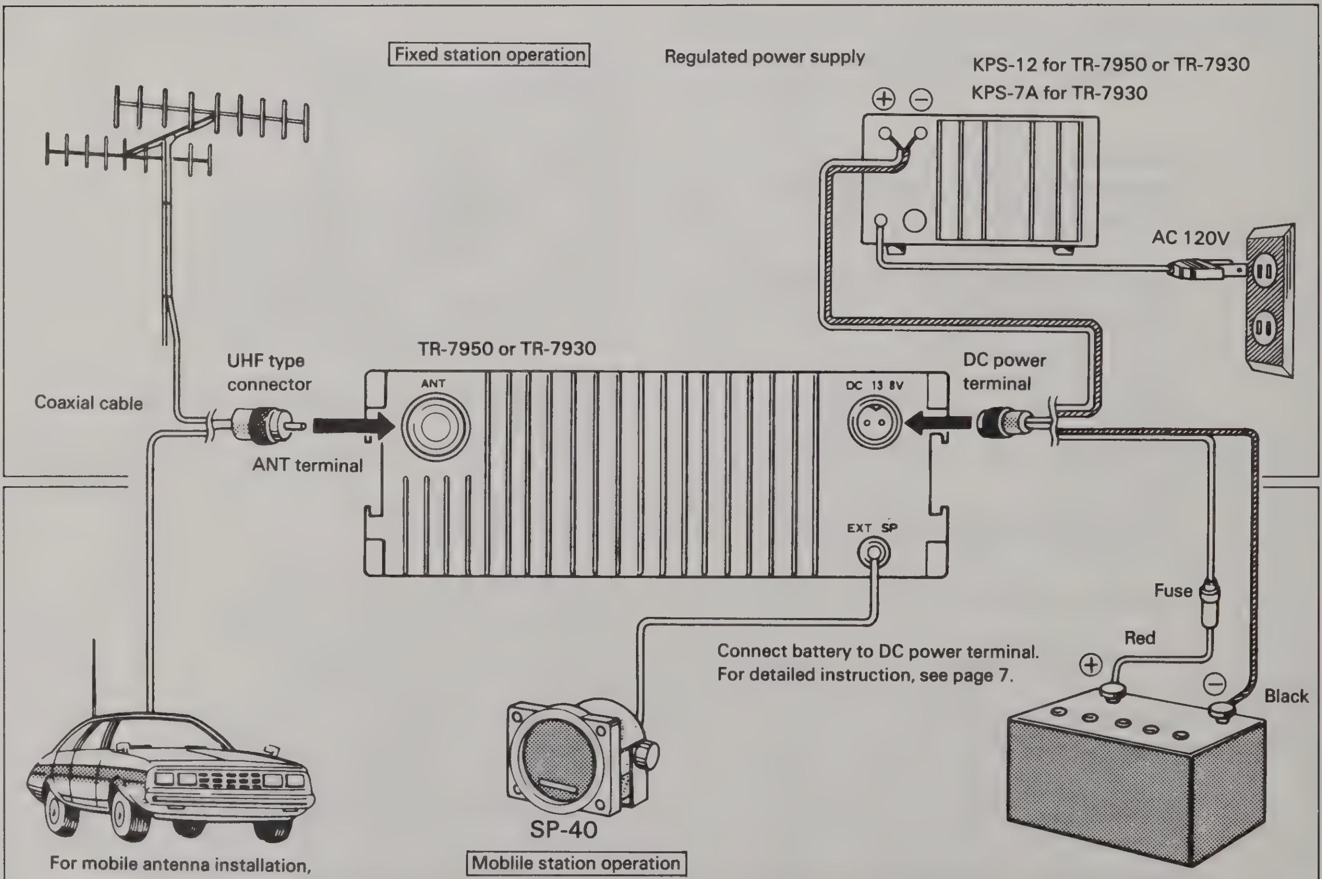


Fig. 1-1 Antenna and Power Supply Connections

1-3. FIXED STATION Installation, [general]

- **Power supply (Fig. 1-3 on page 8)**

For the TR-7950, the KPS-12 base power supply is recommended. For the TR-7930, either the KPS-12, or KPS-7A supply is recommended.

- **Antenna (Fig. 1-3 on page 8)**

Various types of fixed station antennas are commercially available. Select an antenna according to your installation space and application.

Note that the VSWR of your antenna should be less than 1.5:1.

A high VSWR will cause the Transceiver's protective circuit to operate, reducing the transmitter output power.

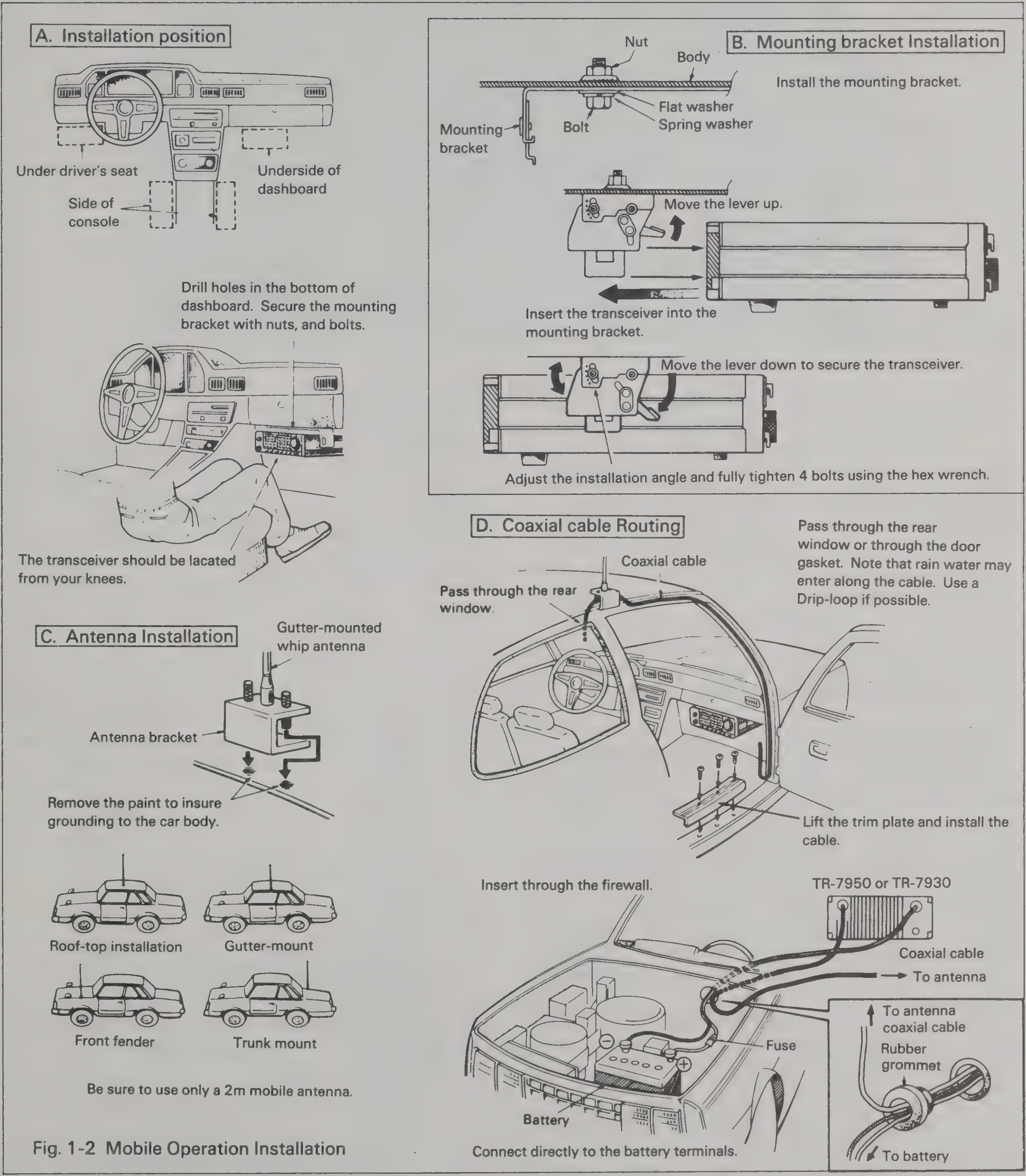
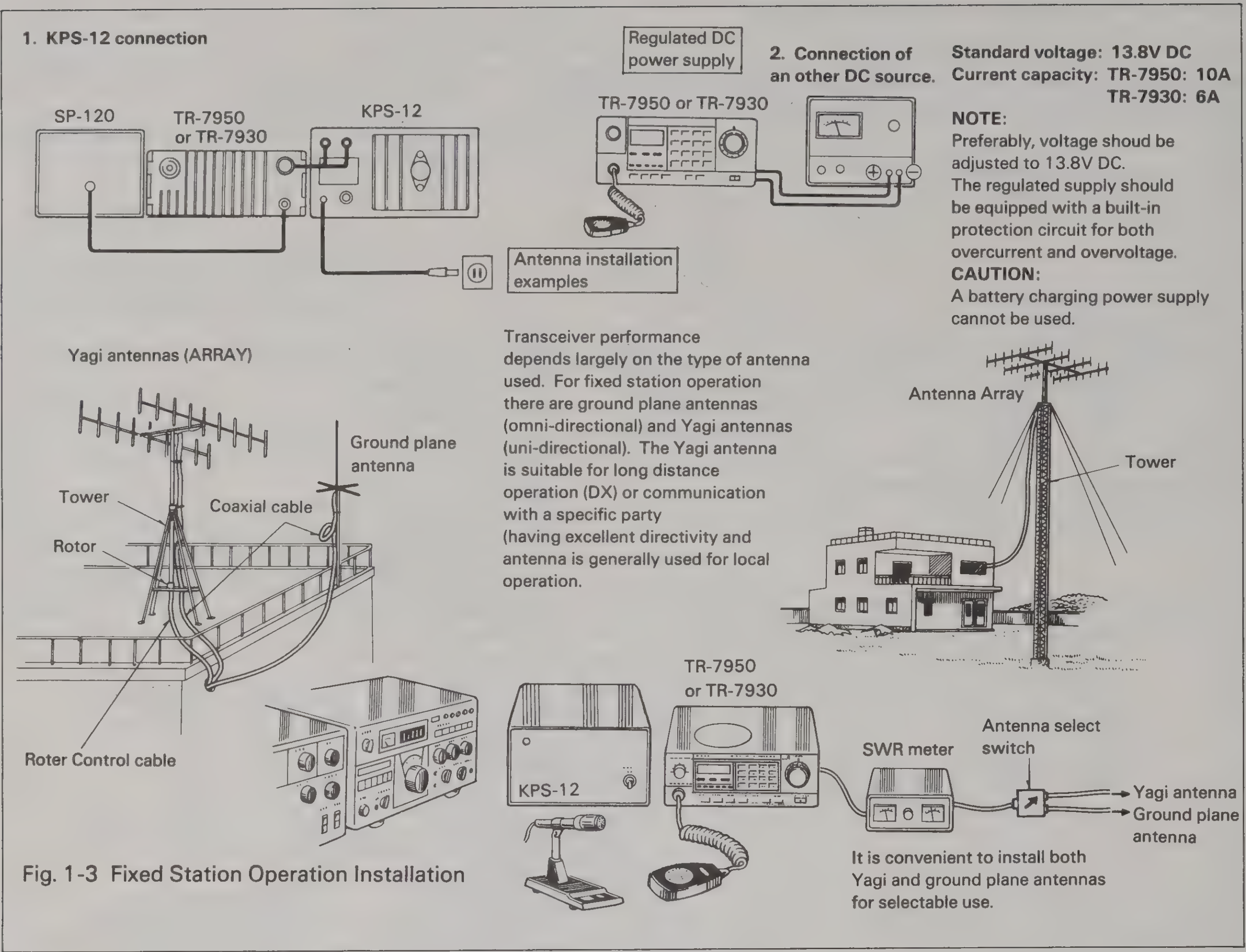

A. Installation position
Under driver's seat
Underside of dashboard
Side of console
Drill holes in the bottom of dashboard. Secure the mounting bracket with nuts, and bolts.
The transceiver should be lacated from your knees.
B. Mounting bracket Installation
Nut
Body
Install the mounting bracket.
Flat washer
Spring washer
Mounting bracket
Bolt
Move the lever up.
Insert the transceiver into the mounting bracket.
Move the lever down to secure the transceiver.
Adjust the installation angle and fully tighten 4 bolts using the hex wrench.
C. Antenna Installation
Gutter-mounted whip antenna
Antenna bracket
Remove the paint to insure grounding to the car body.
Roof-top installation
Gutter-mount
Front fender
Trunk mount
Be sure to use only a 2m mobile antenna.
D. Coaxial cable Routing
Coaxial cable
Pass through the rear window or through the door gasket. Note that rain water may enter along the cable. Use a Drip-loop if possible.
Pass through the rear window.
Lift the trim plate and install the cable.
Insert through the firewall.
TR-7950 or TR-7930
Coaxial cable
To antenna
To antenna coaxial cable
Rubber grommet
Fuse
Battery
Connect directly to the battery terminals.
To battery

Fig. 1-2 Mobile Operation Installation



Standard voltage: 13.8V DC
Current capacity: TR-7950: 10A
TR-7930: 6A

NOTE:
Preferably, voltage shoud be adjusted to 13.8V DC.
The regulated supply should be equipped with a built-in protection circuit for both overcurrent and overvoltage.

CAUTION:
A battery charging power supply cannot be used.

Transceiver performance depends largely on the type of antenna used. For fixed station operation there are ground plane antennas (omni-directional) and Yagi antennas (uni-directional). The Yagi antenna is suitable for long distance operation (DX) or communication with a specific party (having excellent directivity and antenna is generally used for local operation.

It is convenient to install both Yagi and ground plane antennas for selectable use.

Fig. 1-3 Fixed Station Operation Installation

1-4. MEMORY BACK-UP LITHIUM BATTERY

A lithium battery is contained in the transceiver to retain memory. Therefore, turning off the POWER switch, disconnecting the power cable, or a power failure will not clear the memory. The battery will last approximately five years. When the battery discharges and erroneous display may appear on the LCD. Lithium battery replacement should be performed by an authorized Kenwood service facility – either your Kenwood dealer, or the factory.

Note:

When the lithium battery is replaced, the microprocessor must be reset. Press the microswitch accessible through the opening on the bottom cover, as shown.

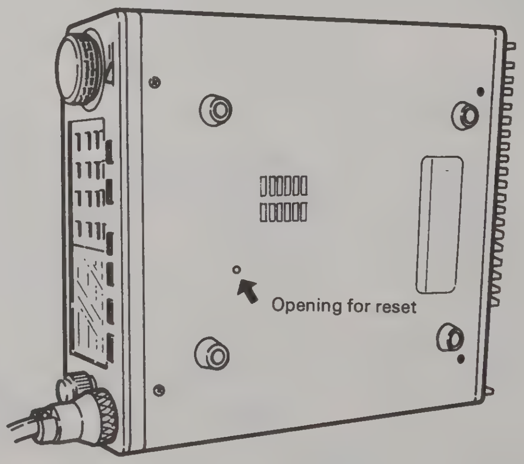
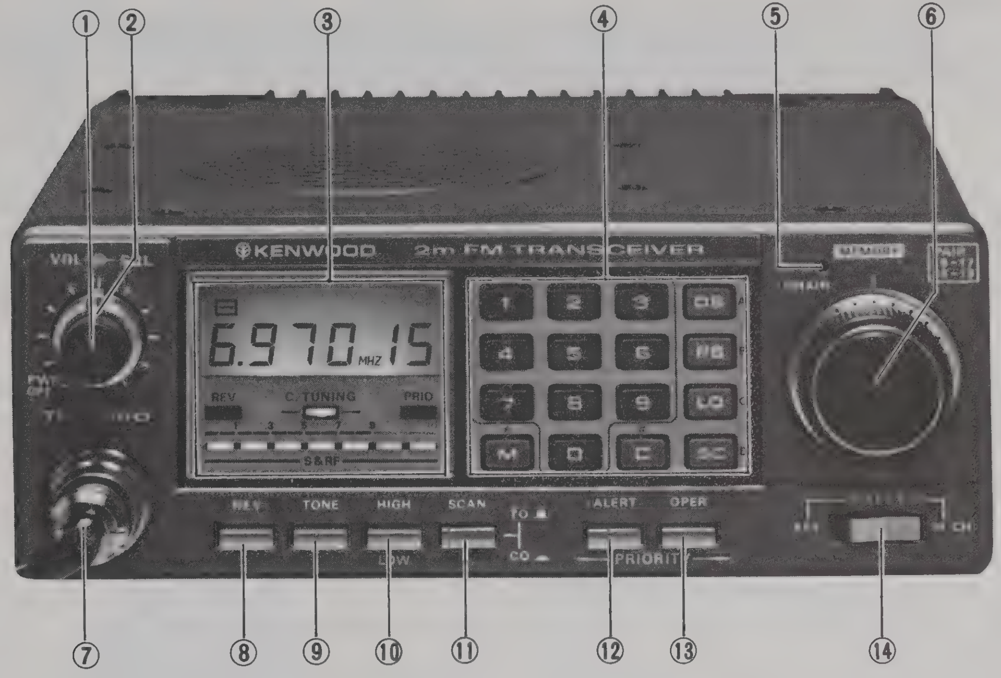


Fig. 1-4 Microprocessor reset

SECTION 2. CONTROLS AND TERMINALS



2-1. Front Panel

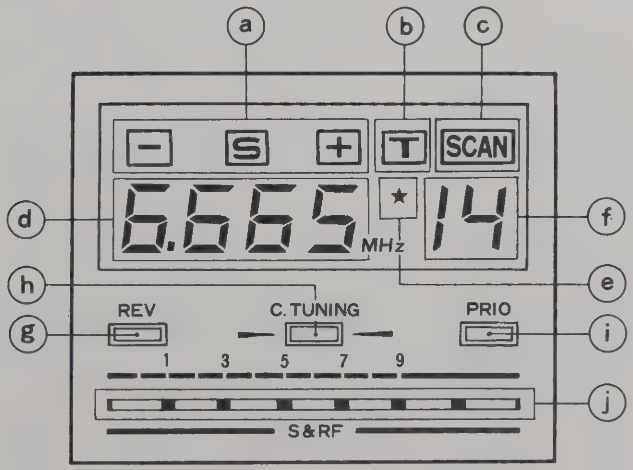
① VOL/POWER

Power ON-OFF switch and volume control are combined. Turning the control fully counterclockwise will turn the power OFF. Clockwise rotation will increases the volume.

② SQUELCH

The squelch control is used to eliminate noise during no-signal time. Normally, this control is adjusted clockwise until the noise disappears and the Center Tuning indicator goes off (threshold level). For scan operation, this control must be set to the threshold point.

③ LCD and Indicator Group



a) TX shift indicators:

− By pressing the OS key on the keyboard, the − indicator will light in sequence to show transmit frequency is switched down 600 KHz from the receive frequency.

S By pressing the OS key on the keyboard, the S indicator will light in sequence to show the transceiver is operating in the simplex mode.

+ By pressing the OS key on the keyboard, the + indicator will light in sequence to show transmit frequency is switched up 600 KHz from the receive frequency.

b) T indicator:

By pressing the TONE pushbutton the four digit frequency display changes to show which of three preset subaudible frequency channels is selected. T does not display at F0 (no tone). TU-79 option required.

c) SCAN indicator lights when scan operation is in progress.

d) This section displays either frequency in four digit (146.520 MHz is displayed as 6.520), or one of four subtone conditions (F1 – 3, or 0, no tone).

e) ★ mark:

Memory channel scan lock-out designator.

If you desire to skip a busy memory channel during memory scan, press the LO key. The star designates scan-skip.

f) Memory channel display indicates A. B. and 1 ~ 19.

g) This LED indicator lights when the REV switch is ON.

h) This indicates the transceiver has stopped at channel center.

i) This LED indicates the PRIORITY-OPER switch ON.

j) S/RF Level meter
This LED level meter indicates relative receive input signal strength or transmit RF output.

④ Keyboard

"BEEPER" TONE FEEDBACK
Many keys and functions supply user-feedback to assure command entry or excecution. Tone level is adjustable. See page 13, "Beeper" level adjustment.
Tone signals:

* Keyboard operation frequency entry
* Subtone frequency (preset channel number 1 – 3, 0)
* Memory * Clear * Scan * Offset
* Program scan
* Lockout (initiate or cancel)
* Tone subtone) on or off

Channel 1 selected by memory channel selector knob (especially convenient for visually impaired OPS) microphone UP or DWN switches; pressonce, one "beep" hold, one "beep" per step or channel.
The keyboard has the following functions (Refer to "SECTION 3. OPERATION"):

- 1–0 (Number) keys:

Depress four keys to set the desired operating frequency.
Example: Depress the 6, 9, 4 and 0 keys. The frequency display will indicate "6.940" (146.940 MHz).
The number keys function as auto-patch keys during transmit mode (Section 3-6).
Pressing 1, 2, or 3 in the TONE MODE selects the preprogrammed tone frequency. Pressing 0 cancels the selected tone frequency.

- OS (Offset select) key

Depress this key to select a non standard frequency shift (simplex, +, or –, 600 kHz). (Standard frequency shift are preset.)

- PS (Priority Select) key

This is used to designate the priority channel. First, select the desired channel, then depress the PRIORITY-ALERT switch and press the PS switch.

- LO (Lock-out) key

This is used to designate the memory channels to be skipped during memory channel scan. Select the channel to be skipped with the SELECT switch set to M. CH and press this key. A star ★ appears on the LCD to show channel lock-out .

- SC (Scan) key

This is used for scan operation. Press the key when the SQUELCH (2) is ON. This will start band or memory-scan, depending on the position of the SELECT switch.

- M key

With the SELECT switch in the KEY setting, press this key to store the displayed frequency (with frequency shift) in the selected memory channel. In the TONE MODE and the desired tone frequency selected (1, 2, 3 or 0), pressing this key either stores or clears the TONE designation in memory.

- C (Clear) key

Use this key if you have mistakenly entered a setting.
By pressing this key, the frequency set by the number keys is cleared. When cleared, the frequency display will indicate the frequency that was displayed before the last entry was cleared.
This key is also used to release the scan operation.
Auto Patch:
This is a 16 button pad in Transmit mode.
During transmission, the key pad is automatically a Tone pad. Simply press any key, as needed.

⑤ ON AIR Indicator

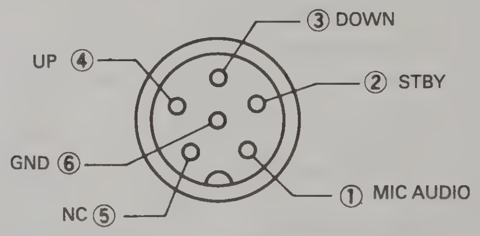
This light emitting diode (L.E.D.) will light during transmit mode.

⑥ MEMORY Channel Selector

This switch is used to select one of 21 memory channels. Of these, channels 1-15 store frequencies including ±600 kHz offset. Channels, 16 – 17 and 18 – 19 are paired for "ODD-SPLIT" operation. Channel A stores the programmed scan low frequency limit, and channel B stores the high frequency limit.

⑦ MIC Connector (6-pin)

For connection of the supplied microphone (or and MC-46 autopatch microphone).



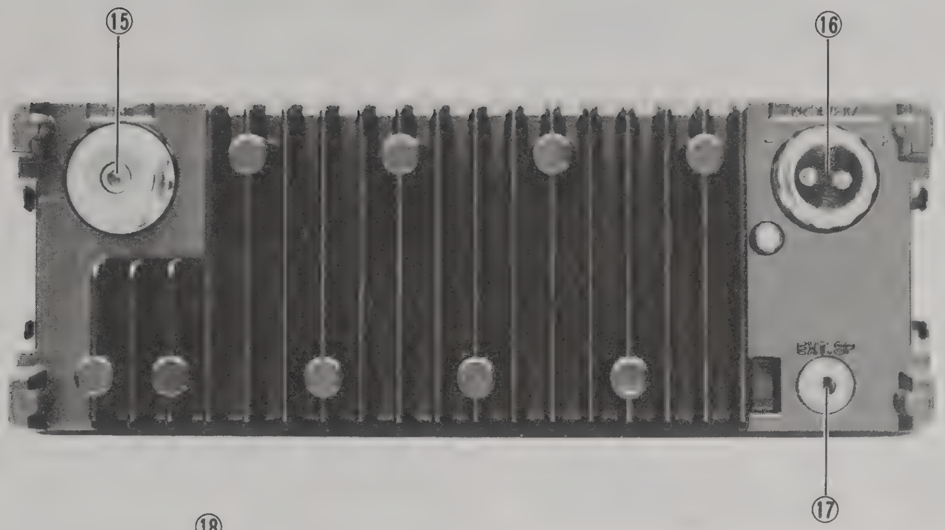
MIC connector from FRONT PANEL (lead color)

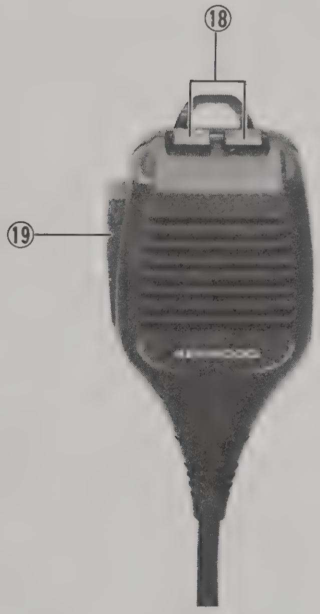
⑧ REV Switch

This switch is used to reverse the repeater shift (±600 kHz) and other transmit/receive frequencies (CH 16 – 17, 18 – 19).

⑨ TONE switch

Press this switch to designate the tone preset frequency channel, along with the 1, 2, or 3 keys. (TU-79 option required for operation.)





⑩ HIGH/LOW switch

HIGH setting: This setting allows the TR-7950 to transmit power output up to 45 watts and the TR-7930 up to 25 watts.
LOW setting: This setting allows the TR-7950 or TR-7930 to transmit power output up to 5 watts.

⑪ SCAN switch

Placing this switch to the TO (timer operation hold) position controls the scan operation by a timer (approximately 5 seconds, adjustable).
Placing this switch to the CO (carrier operated hold) position controls the scan operation by carrier; therefore, scan stops for as long as a carrier is present.

⑫ PRIORITY ALERT Switch

This switch is used to check the specified priority channel. Depress the switch and the priority channel will be checked at about a 6 second interval regardless of the KEY/M. CH switch position. A "dual beep" sounds when the priority channel is in use.

⑬ PRIORITY OPER Switch

This switch is used to call-up the priority channel. By depressing the switch, operating frequency is switched to the priority channel, and the PRIO LED lights to show operation.

⑭ SELECT Switch

Setting this switch to KEY permits keyboard operation; setting to M. CH permits preset memory channel operation.

2-2 Rear Panel

⑮ ANT Terminal

Connect a 50-ohm antenna to this terminal.

⑯ DC Power Terminal

DC power input terminal. Connect the supplied power cord with plug. Input voltage is 13.8V DC.
Observe plus(+) and minus(–) polarity!

⑰ EXT. SP Terminal

External speaker terminal. Connect a 4 ~ 16 ohm speaker using the supplied plug.

⑱ UP/DWN Switches

These switches are used to step the operating frequency up or down during both keyboard and memoriy channel operation.
When pressing a switch, a tone will sound.
When the UP or DWN switch is held on, scan mode is intiated.
Pressing both the UP and DWN switches simultaneously results in stopping the frequency control operation.

⑲ PTT Switch

Press-to-talk switch used for transmission. This will also release scan operation.

SECTION 3 OPERATION

3-1 BEFORE OPERATION

1. This transceiver uses a PLL(phase loocked loop) synthesizer controlled by a micro-computer. The operating frequency shifts in 5 kHz steps.
2. The transceiver covers a frequency range of 142.000 to 148.995 MHz.
3. Operating frequencies are input by simple keyboard entry. Up to 21 frequencies may be stored in memory (channels 1 through 19, A and B).
4. Transmitter precautions
   a) The TR-7950 (or TR-7930) antenna impedance is 50 ohms. Be sure to use only an antenna of 50-ohm impedance.
   b) Check the intended transmit frequency before operating to prevent interference with other stations.
   c) Pressing the microphone PTT switch places the transceiver in transmit mode; the ON AIR indicator will light and the LED bar meter shows transmitter power. Recommended distance to the microphone is approximately 5 cm.
5. Should an erroneous or incorrect readout be displayed at first power-on, reset the microprocessor by depressing the reset microswitch, following the instruction on page. 7.
6. Do not press any other keys until the correct frequency is input. The transceiver operates on the last frequency until a new frequency is input.
7. The shift mode is preprogrammed within the amateur band. This, however, can be overridden by the OS key.

f142.0	145.1	145.5	146.0	146.4	146.6	147.0	147.4	147.6	148.0	148.995
S	−	S	+	S	−	+	S	−	S	

8. For frequencies outside the 144.000 – 148.000 MHz, the transceiver operates only in the simplex mode.

3-2 SQUELCH

To eliminate receiver noise at the no-signal condition, slowly adjust the squelch clockwise until the noise disappears and the C. TUNING indicator goes off (threshold point).

The squelch will open, the C. TUNING indicator will light and the speaker will operate when a signal is received.

The squelch control is also used for scan operation control. If the singal is weak or fades during mobile operation, readjust the squelch for consistent reception.

3-3 MEMORY INPUT

Example: Storing 144.650 MHz with +600 kHz shift and subaudible tone "1" in memory channel 5.

Proceed:

1. Set the SELECT switch to KEY.
2. Press the 4, 6, 5, and 0 keys.
3. Press the OS key until + displays on the LCD.
4. Turn the MEMORY channel selector until memory 5 displays.
5. Press the M key to store in memory channel 5.
6. Press the TONE switch and select the desired tone frequency; in this case, by pressing the 1 key.
7. Again press the M key to store the TONE information in channel 5. Press the TONE switch again to call the stored frequency back to the display.
8. To check or recall the entry in channel 5, place the SELECT switch to M. CH. Display should remain unchanged, indicator data is correctly stored.
9. Use this general procedure to store frequencies in the other memory channels.

3-4 CHANGING MEMORY FREQUENCIES

If you wish to change any memory frequency, store a new frequency in that channel using the precious procedure. The old frequency is erased when the new frequency is stored.

3-5 SCAN OPERATION

The SCAN operation is divided into keyboard scan, memory scan and priority channel scan. For SCAN operation, the squelch control should be advanced to the threshold point. See section 3-2 Squelch.

First, select either timer operated hold (TO) carrier (signal) operated hold (CO) with the SCAN switch.

- **MEMORY SCAN from the keyboard**

1. Set the SELECT switch to M. CH.
2. Press the SC key to initiate scanning .
   The scan will beigin from the displayed channel advancing, toward the higher numbered channels. During this operation, holding the microphone DWN switch changes scan direction backward. Releasing the DWN switch returns scan direction forward. Holding the UP switch permits accelerated scanning.
3. To release the scan operation, press either the C key, the microphone PTT swith, or the microphone UP and DWN switches simultaneously.

- **MEMORY SCAN from the microphone**

1. Set the SELECT switch to M. CH.
2. Hold the UP (or DWN) switch for more than one second and scan operation will commence UP (or DWN) from the displayed channel. During this scan operation, pressing the DWN (or UP) switch once reverses the scan direction.

3. To manually accelerate scanning, hold the UP (or DWN) switch until the desired memory channel is reached.
4. To release the scan operation, press the PTT switch or the UP and DWN switches simultaneously.

- **PROGRAMMABLE BAND-SCAN from the keyboard**

The lower limit may be programmed into memory "A", and the upper limit in to memory "B".

1. Set the SELECT switch to KEY.
2. Press the SC key to initiate scan operation.
   Scan will start from the frequency stored in memory channel A and advance to the frequency stored in channel B. When the frequency in memory channel B is reached the process. During this operation, holding the microphone DWN switch changes the scan direction backward. When the DWN switch is released , the forward scan direction resumes. Holding the UP switch accelerates scanning.
3. To release the scan operation, press the C key, the microphone PTT switch, or the microphone UP and DOWN switches simultaneously.
4. To continue an interrupted keyboard scan from its stopping-point, use the microphone UP or DWN switches. Otherwise, the C key will always return the radio to the A channel frequency.

- **AUTO SCAN from the microphone**

1. Set the SELECT switch to KEY.
2. Hold the UP (or DWN) switch for more than one second. Scan operation will commence from the frequency displayed towards the upper frequency limit (148.995 MHz) or if down,towards the lower limit (142.000 MHz).
   During this scan, press the DWN (or UP) switch reverses the scan direction.
3. To accelerate the scan, hold the UP (or DWN) switch until the desired frequency is reached.
4. To release the scan operation, press the PTT switch or the UP and DWN switches simultaneously.

- **PRIORITY CHANNEL SCAN**

To monitor the priority channel, press the PRIORITY-ALERT switch in. When it is busy two beeps will sound every six seconds. The REV switch deactivates this system.

3-6 SCAN STOP

1. Scan may be canelled by turning off the power switch or power supply.
2. Transmitting or momentarily keying the PTT switch.
3. Pressing the keyboard C key.
4. Pressing the microphone UP and DWN switches simultaneously.
5. Pressing the REV switch.
6. Pressing the PRIORITY ALERT switch.
7. Pressing the PRIORITY OPER switch.
8. Moving the SELECT switch to the alternate mode.

3-7 SCAN LOCKOUT OPERATION

This transceiver has a scan lockout function which allows selectively skipping temporarily unwanted memory channels during memory scan.

Proceed:

1. Place the SELECT switch to M. CH.
2. Select the memory channel to be skipped by using the MEMORY selector.
3. Press the LO key and a star ★ appears to the left of the memory channel number.
4. Perform steps 2 and 3 to lockout any unwanted memory channels.
   To cancel channel lockout, select the memory channel to be restored, and press the LO key. The star will disappear.

3-8 PRIORITY CHANNEL SELECT

Any one of the 21 memory channels can be selected as the priority channel.

1. Set the SELECT switch to M. CH.
2. Press the PRIORITY-ALERT switch in.
3. Select the memory to be the priority channel.
4. Press the PS key to enter this instruction.

3-9 PRIORITY OPER Switch

To call-up the frequency stored in the priority channel, depress the PRIORITY OPER switch.

3-10 AUTOPATCH OPERATION

Press any key on the keyboard in transmit mode for autopatch operation.

3-11 TIMER OPERATED SCAN (TO) ADJUSTMENT

The scan timer is factory preset at approximately 5 seconds. This can be adjusted from 2 to 6 seconds.

1. Place the SCAN switch to TO.
2. Turn the SQL control fully counterclockwise to open the squelch.
3. Place the SELECT switch to M. CH.
4. Initiate scan by pressing the SC key.
5. Adjust VR1 (X53-1280-10) to the desired delay. (see Botton Biew on page 14.)

3-12 AUTOPATCH SIDETONE AND BEEPER LEVEL ADJUSTMENT

The autopatch sidetone level during and beeper level transmit are adjustable. As the volume is advanced, the level increases.

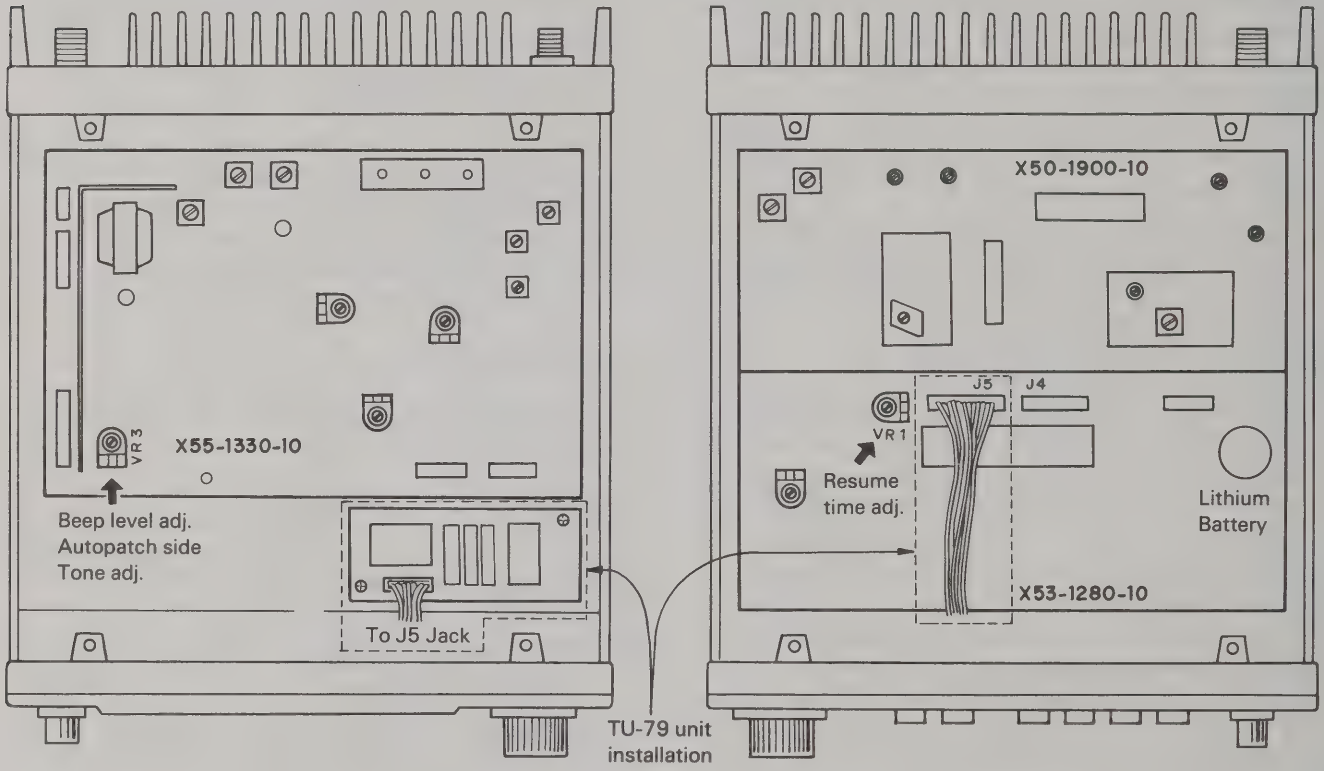
1. Adjust the VOL control to your normal listening leve.
2. With the microphone PTT press any key on the keyboard switch depressed and adjust VR3 (X55-1330-10) shown on page 14.

3-13 PAIRED CHANNELS

Two paired channels allow for "odd split" frequency shifts. Use this option when the desired frequency shift is to other than the standard 600 kHz shift. Any split within the full operating and range of the radio is possible.
Channel pairs are: CH's 16 – 17 and CH's 18 – 19
Example: A 1 MHz split store 145.600 MHz in CH 16 and 146.600 MHz in CH 17.

1. Follow the "MEMORY INPUT" procedure on page 12 to store these frequencies in channels 16 and 17. Either frequency (receive or transmit) may be stored in either channel of the pair.
2. To operate this channels pair, set the SELECT switch to M. CH and select either CH 16 with the MEMORY selector.
3. Transmit, and the displayed frequency changes to the transmit frequency stored in the alternate channel of the pair.
4. Return to the receive mode, and the original receive frequency stored in CH 16 will display.

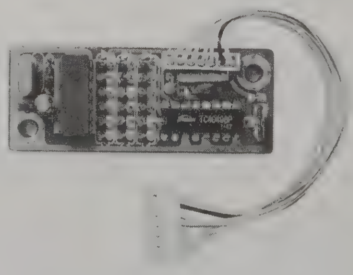
The other channel pair, CH 18 – 19, operates in the same way. When channel pairs are used, the 600 kHz shift and-mode indicators, +, −, and S, do not funtion.



Top View **Bottom View**

3-14 TU-79 (OPTION) INSTALLATION

1. Secure the TU-79 unit with 2 screws as shown in figure (Top View, whithin dotted line).
2. Plug the TU-79 lead connector to the jack (J5) shown in the figure (Bottom View).
3. Three tone frequencies can be selected out of 37 frequencies (67 Hz ~ 250.3 Hz). This can be done by 6 bit diode matrix.
4. Tone deviation is within ±0.5 ~0.7 kHz, adjusted.



TU-79

SECTION 4 ADDITIONAL INFORMATION

4-1 General Information

Your TR-7950 (or TR-7930) has been factory aligned and tested to specification before shipment. Under normal circumstances, the transceiver will operate in accordance with these operating instruction.

If your transceiver fails to work, contact the authorized dealer from which you purchased it for quick, reliable repair. All adjustable trimmers and coils in your transceiver were preset at the factory and should only be readjusted by a qualified technician with proper test equipment.

Attempting service or alignment without factory authorization.

4-2 How the TX Final Module are Protected

Final module protection is provided by sampling the reflected power. As the reflected power is increased (higher SWR) transmitter drive is reduced, thus decreasing input to the final module. This in turn reduces collector loss, protecting the final transistor.

4-3 Battery Precaution

When charging your vehicle battery, or when jump-starting a dead battery, ALWAYS disconnect the power cable from the back of the transceiver.

4-4 Ordering Spare Parts

When ordering replacement or spare parts for your equipment, be sure to specify the following:

- Model and serial number of your transceiver. Schematic number of the part. Printed circuit board number onwhich the part is located. Part number and name, if known,and quantity desired.

NOTE:

A full service manual is availabel as a separate publication.

4-5 Service

Should it ever become necessary to return the equipment for repair, pack in its original box and packing,and include a full description of the problems involved. Also include your telephone number. You need not return accessory items unless directly related to the service problem. Tag all returned items with your call for identification.

Please mention the model and serial number of your radio in any correspondence, whether phone or written. For future reference, record this informationin the space provided on the back cover of this manual.

NOTE:

When claiming waranty service, please include a photocopy of the bill of sale,or other proof of purchase showing the date of sale.

TU-79 Tone frequencies

Note :

Symbols in the table below denotes as follows ;

X — Cut diode, O — Diode remains mounted.

#	EIA Specification		Program Lines					
	Group	Hz	1	2	3	4	5	6
1	C	67.0	X	X	X	X	X	X
2	B	71.9	X	O	X	X	X	X
3	C	74.4	X	X	O	X	X	X
4	A	77.0	O	O	X	X	X	X
5	C	79.7	X	X	X	O	X	X
6	B	82.5	X	O	O	X	X	X
7	C	85.4	X	X	O	O	X	X
8	A	88.5	O	O	O	X	X	X
9	C	91.5	X	X	X	X	O	X
10	B	94.8	X	O	X	O	X	X
11	A	100.0	O	O	X	O	X	X
12	B	103.5	X	O	O	O	X	X
13	A	107.2	O	O	O	O	X	X
14	B	110.9	X	O	X	X	O	X
15	A	114.8	O	O	X	X	O	X
16	B	118.8	X	O	O	X	O	X
17	A	123.0	O	O	O	X	O	X
18	B	127.3	X	O	X	O	O	X
19	A	131.8	O	O	X	O	O	X
20	B	136.5	X	O	O	O	O	X
21	A	141.3	O	O	O	O	O	X
22	B	146.2	X	O	X	X	X	O
23	A	151.4	O	O	X	X	X	O
24	B	156.7	X	O	O	X	X	O
25	A	162.2	O	O	O	X	X	O
26	B	167.9	X	O	X	O	X	O
27	A	173.8	O	O	X	O	X	O
28	B	179.9	X	O	O	O	X	O
29	A	186.2	O	O	O	O	X	O
30	B	192.8	X	O	X	X	O	O
31	A	203.5	O	O	X	X	O	O
32	B	210.7	X	O	O	X	O	O
33	A	218.1	O	O	O	X	O	O
34	B	225.7	X	O	X	O	O	O
35	A	233.6	O	O	X	O	O	O
36	B	241.8	X	O	O	O	O	O
37	A	250.3	O	O	O	O	O	O

SECTION 5. OPTIONAL ACCESSORIES

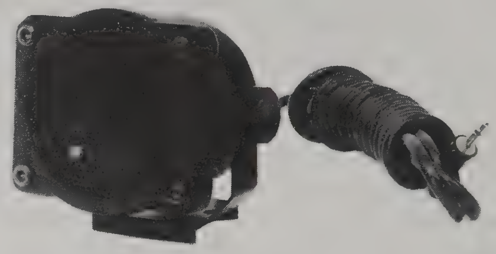
The following accessories are available for more sophisticated operation of your transceiver.

5-1 Fixed Station DC Power Supply KPS-12A

The KPS-12 DC power supply matches both the TR-7950 and TR-7930 while the KPS-7A matches the TR-7930.

5-2 SP-40 External Speaker

Designes primarily for mobile operation. Styling and tone quality match ytour tranceiver.



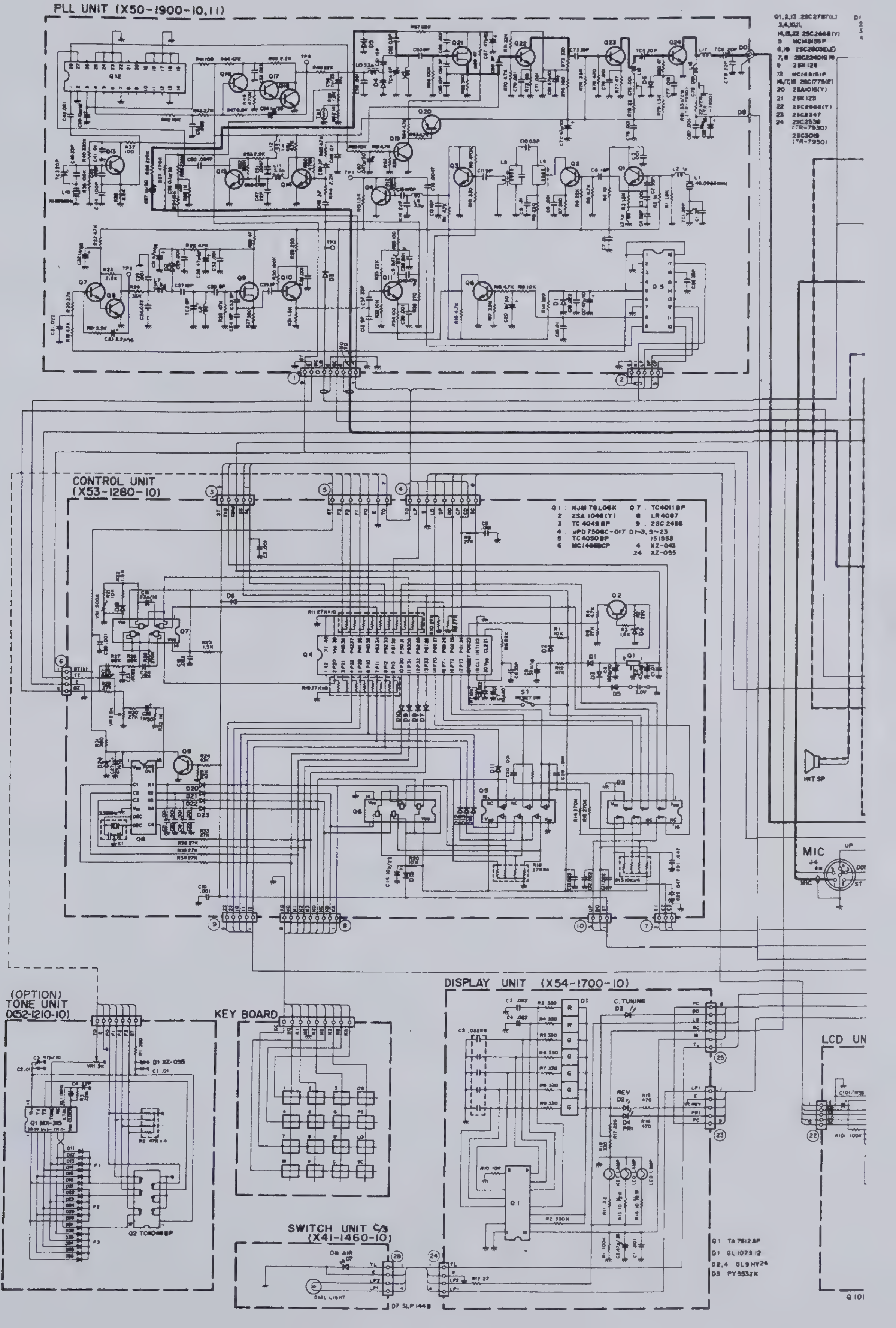
SP-40

5-3 TU-79 Tone Unit

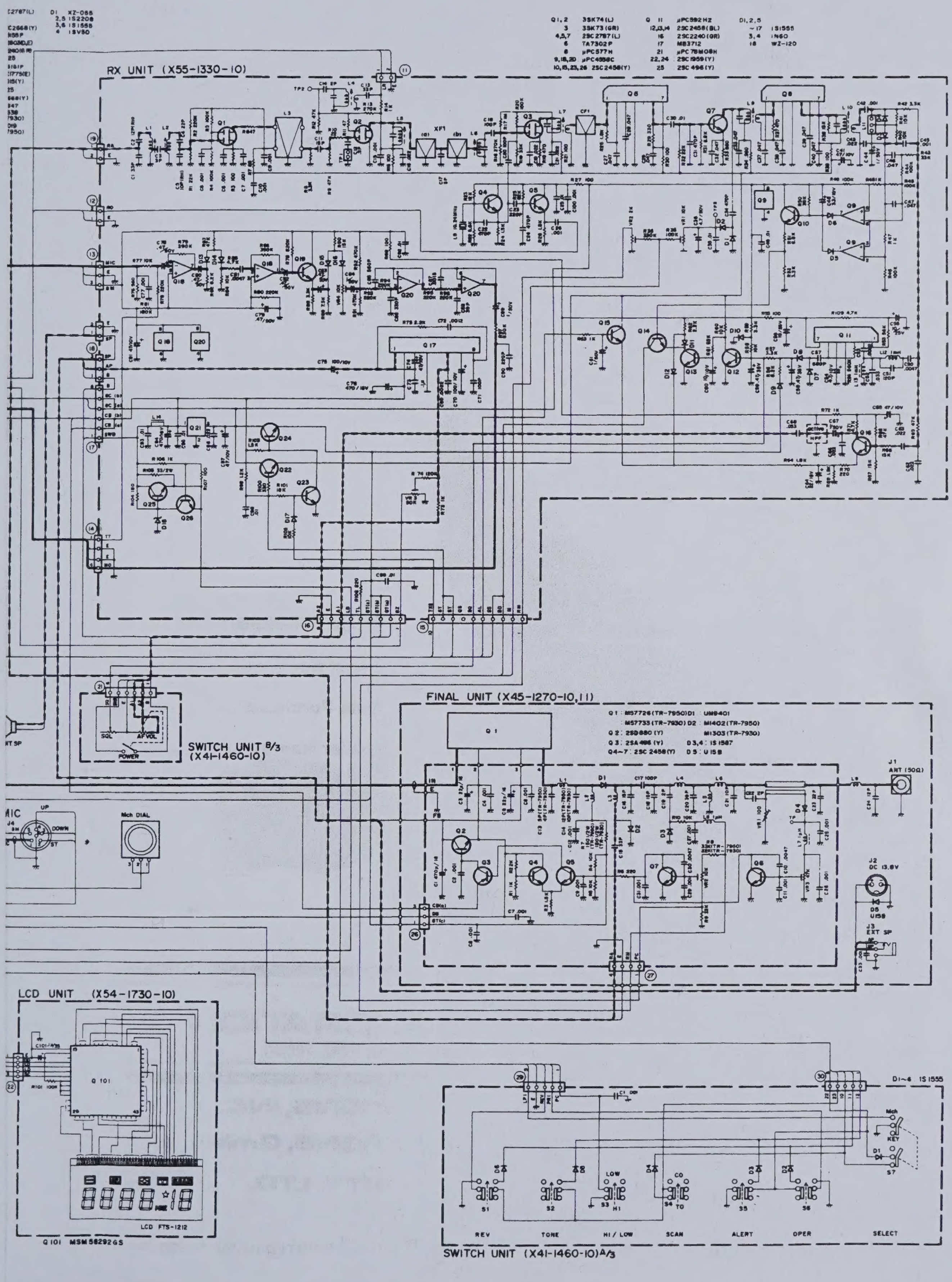
MEMO

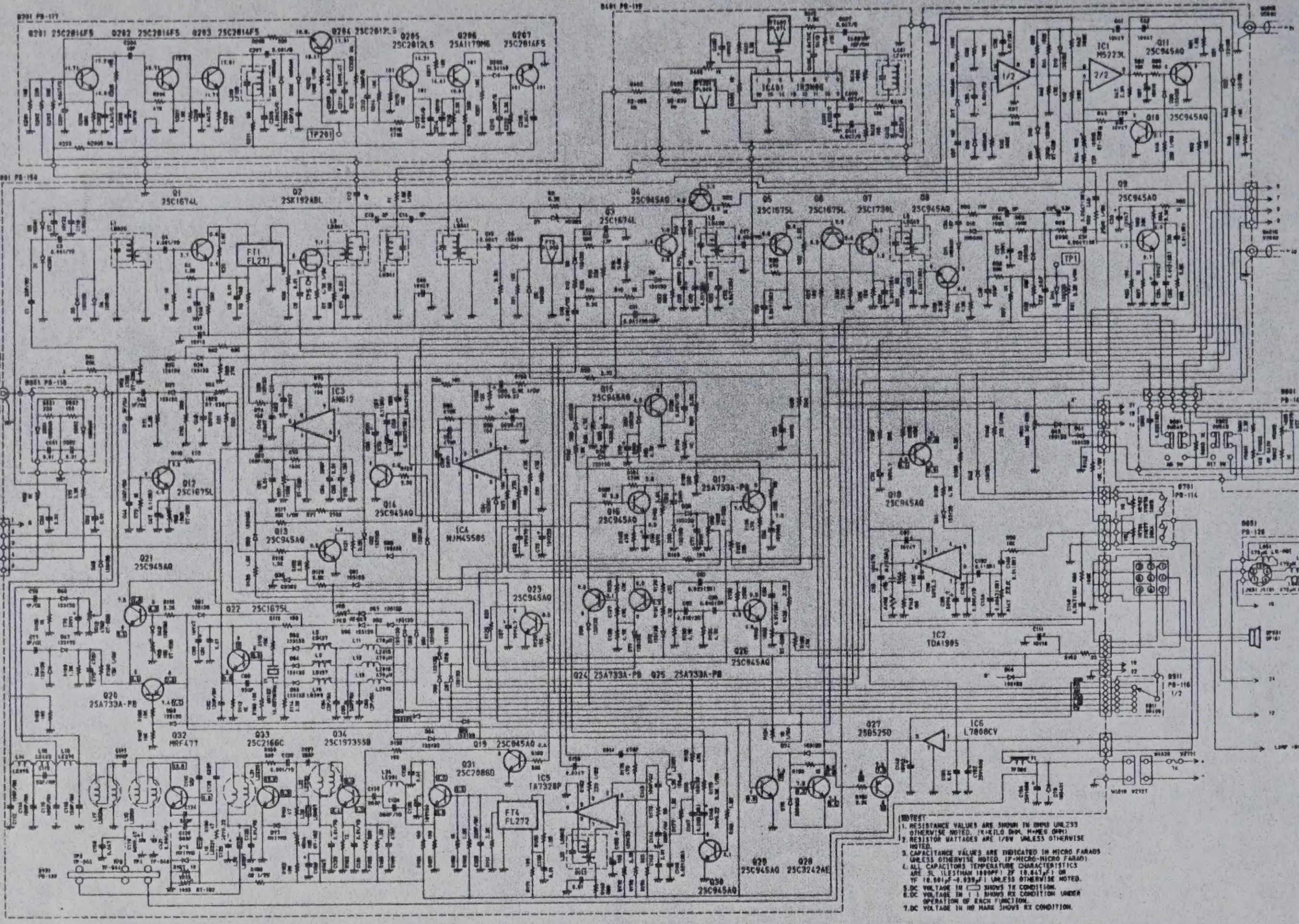
MEMO

TR-7950/7930 S

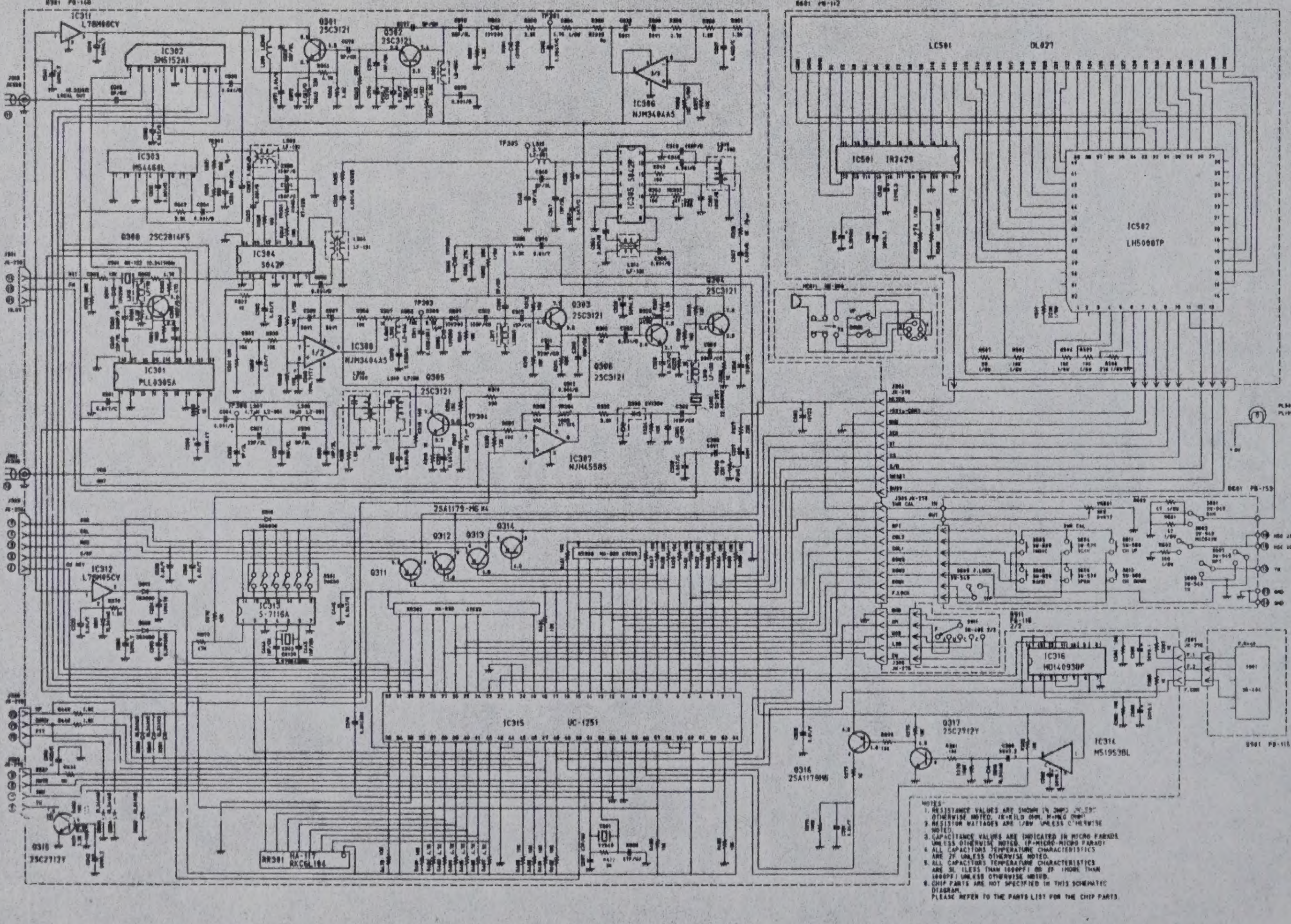


) SCHEMATIC DIAGRAM





NOTES:
1. RESISTANCE VALUES ARE SHOWN IN OHMS UNLESS OTHERWISE NOTED. (K=KILO OHM, M=MEG OHM)
2. RESISTOR WATTAGES ARE 1/8W UNLESS OTHERWISE NOTED.
3. CAPACITANCE VALUES ARE INDICATED IN MICRO FARADS UNLESS OTHERWISE NOTED. (P=MICRO-MICRO FARAD)
4. ALL CAPACITORS TEMPERATURE CHARACTERISTICS ARE SL (LESS THAN 1000PF) ZF (0.047μF) OR YF (0.001μF-0.039μF) UNLESS OTHERWISE NOTED.
5. DC VOLTAGE IN ▭ SHOWS TX CONDITION.
6. DC VOLTAGE IN ( ) SHOWS RX CONDITION UNDER OPERATION OF EACH FUNCTION.
7. DC VOLTAGE IN NO MARK SHOWS RX CONDITION.



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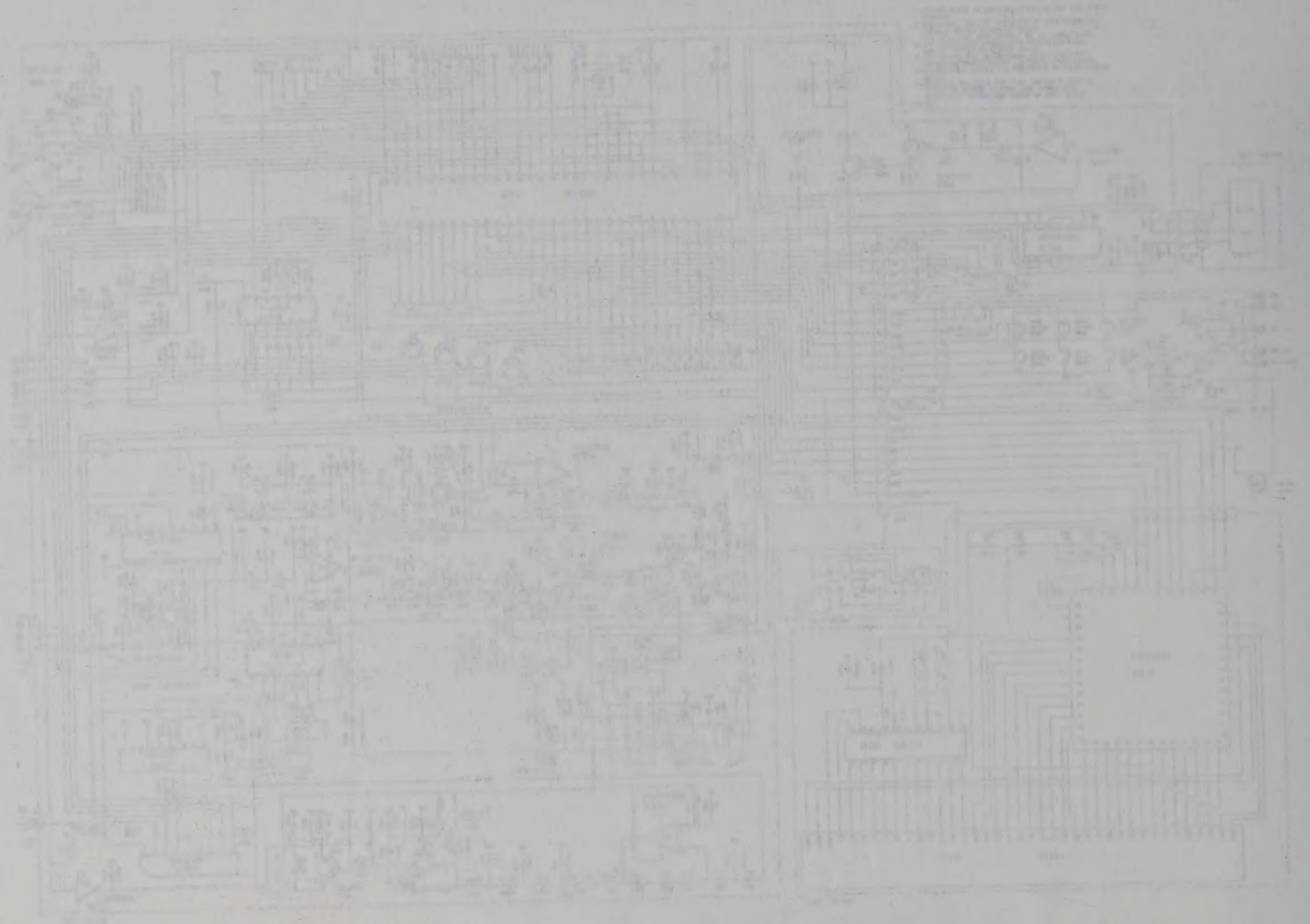
4. ALL CAPACITORS TEMPERATURE CHARACTERISTICS ARE ZF UNLESS OTHERWISE NOTED.
5. ALL CAPACITORS TEMPERATURE CHARACTERISTICS ARE SL (LESS THAN 1000PF) OR ZF (MORE THAN 1000PF) UNLESS OTHERWISE NOTED.
6. CHIP PARTS ARE NOT SPECIFIED IN THIS SCHEMATIC DIAGRAM.
PLEASE REFER TO THE PARTS LIST FOR THE CHIP PARTS.



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